

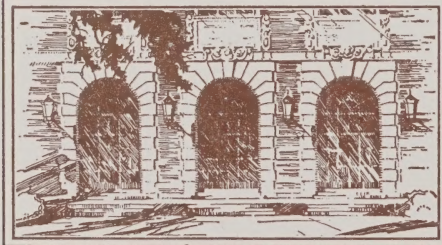
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THE

INTERNATIONAL CYCLOPÆDIA.

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THE INTERNATIONAL CYCLOPÆDIA

A COMPENDIUM OF HUMAN KNOWLEDGE

REVISED WITH LARGE ADDITIONS

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IN FIFTEEN VOLUMES

Vol. V

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THE INTERNATIONAL CYCLOPÆDIA.

DISRAELI, BENJAMIN, Earl of BEACONSFIELD, author and statesman, eldest son of ISAAC, was b. in London, 1804; he received a private education, which was carefully superintended by his father. At the age when most other young men who rise to political distinction are sent to a university, he was articled to a solicitor, with a view of qualifying him for a situation in a government office, which had been obtained for him by his father. The drudgery of a lawyer's office being distasteful to him, he contributed to a tory journal, the *Representative*, which came to an untimely end. In 1837, he published his novel *Vivian Grey*, which was succeeded at intervals by other brilliant works of fiction, including *The Young Duke*; *Contarini Fleming*; *The Wondrous Tale of Alroy*; and *Henrietta Temple*. He also wrote *The Rise of Iskander*; *A Vindication of the British Constitution*; and *The Revolutionary Epic*. After visiting Italy, Greece, Turkey, and Syria, he returned to England, to find the country involved in the reform bill agitation. His sympathies appear now to have inclined to radicalism in politics; and having obtained recommendations from Mr. Hume and Mr. O'Connell, he presented himself in 1832 to the electors of Wycombe, but was defeated. At the general election in 1835, he met with no better success. In April in the same year, he contested Taunton on conservative principles, but again without success. In 1837, his desire for a political career being unabated, he contested Maidstone in the conservative interest along with Mr. Wyndham Lewis. He was elected, and at the age of 32 took his seat in the house of commons. His maiden speech, which was in a high-flown style, and delivered with extravagant gestures, excited the laughter of the house of commons. He was so much disconcerted, that he stopped short abruptly, but not without uttering the remarkable prophecy: "I shall sit down now, but the time will come when you will hear me." In 1838, Mr. W. Lewis died, and in the following year D. married the widow of his late colleague. He then carefully studied the style of successful parliamentary orators, making few speeches. It was not till 1849 that he began to attract notice, and not long afterwards he gained the ear of the house as the leader of the Young England party. After entering parliament, D. wrote several novels—*Coningsby* (1844); *Sybil* (1845); and *Tancred* (1847), in which the principles of Young England are most ingeniously blended with theories about the intellectual supremacy of the Jews, inaccurate scientific notions, and misconceptions of English social life. At the general election in 1841, he obtained a seat for Shrewsbury. He then became the organ of the dissatisfaction with which the landed aristocracy and country gentry regarded sir Robert Peel's relaxations of the system of protection to native industry. His brilliant invective and polished sarcasm inspired the protectionist party with fallacious hope and confidence. On the death of lord George Bentinck in 1848, D. succeeded to the leadership of the protectionist party in the commons. He bore generous testimony to the political consistency and private worth of his predecessor in his *Lord George Bentinck, a Biography*. In 1852, the earl of Derby, having undertaken the construction of a cabinet, offered him the post of chancellor of the exchequer. It was the first time a brilliant novelist had ever figured as the finance minister of a great commercial state and it argues well for the versatility of his genius that he emerged with honor and credit from the ordeal. His second budget, in 1853, failed, however, to find acceptance with the house of commons, and the government being outvoted upon it, the Derby cabinet ceased to exist. D. resumed the leadership of the opposition, from which he was again summoned in 1858, to fill the post of chancellor of the exchequer in the second administration of lord Derby. In 1859, he introduced a measure of parliamentary reform, which, being thrown out, was followed by the resignation of the government. For seven years the liberals remained in power, and Mr. Disraeli, in opposition, displayed talents as a debater, and a spirit and persistency under defeat, which won for him the admiration of his opponents. When lord Derby returned to power in July, 1866, D. again returned to the post of chancellor of the exchequer. It was he chiefly who induced the conservative party to pass the reform bill of 1867, his argument being, that the working-class householders are more conservative than those to whom the franchise had been previously extended. In Feb., 1868, D. succeeded lord Derby as

premier, but, in the face of a hostile majority, he resigned in the following Dec. On this occasion, Mrs. Disraeli, in acknowledgment of her husband's services, was raised to the peerage as viscountess Beaconsfield (died 1872). In 1870, D. published another novel, *Lothair*, marked by most of the merits and defects of those which preceded it. In 1873, the popularity of Mr. Gladstone subsided, and the election of 1874 giving the conservatives a large majority, D. returned to power as prime-minister. In 1877, D. took his seat in the upper house as Earl of Beaconsfield. Still premier, the earl was the guiding spirit of his cabinet during the critical years 1877-78, seeking by energetic action in eastern affairs to give an "imperial" character to English policy; and he returned from the congress of Berlin bringing, as he said, "peace with honor." D. was LL.D. of Edinburgh, D.C.L. of Oxford, and was twice made lord rector of Glasgow university, and held many other honorary offices and titles. The elections of the year 1880 were a surprise to all parties in England. It had been known that there was considerable dissatisfaction with D.'s foreign policy, with the theatrical manner in which he sprang his diplomatic surprises upon the public, with the Royal Titles bill, which he had fathered and carried through parliament, and with the Afghan and Transvaal wars, which had just broken out. The Liberals, therefore, had looked forward to making some parliamentary gains, and a few of the more sanguine had even had hopes of overturning the D. administration by a small majority. The returns showed a sweeping defeat of the Conservatives, the new parliament numbering 349 Liberals, 243 Conservatives, and 60 Home Rulers. D. thereupon resigned his premiership and was succeeded by Gladstone. During his retirement he sometimes spoke in the House of Lords in indignant and sarcastic protest at the reversal of his favorite measures. He also published his last work of fiction, *Endymion*, 1880. He died at his house in Curzon street, London, 1881, April 19, and was buried on the 26th in the churchyard of Hughenden, Buckinghamshire. See *Lord Beaconsfield's Correspondence with his sister*, 1832-52 (1886); his *Selected Speeches*, edited by Kebbel (2 vols. 1882); Clayden, *England under Lord Beaconsfield* (1880); Thompson, *Public Opinion and Lord Beaconsfield* (1886); the *Lives* by John Mill (1863), O'Connor (hostile, 1879), Brandes (trans. 1880), Clarigny (French, 1880), Ewald (1882), Hitchman (1885), Kebbel (1888), Froude (1890).

DISRAELI, ISAAC, D.C.L., a well-known English author, was the descendant of a Hebrew family which flourished first in Spain, and afterwards in Italy. His father, Benjamin D'Israeli, came to England in 1748, entered into business in London, amassed a fortune while yet in middle life, and retiring to Enfield, there died in 1817, aged 90. His son Isaac, born at Enfield in 1766, was educated at Amsterdam and Leyden. He commenced his career as a poet and novelist; but, after the publication of the first volume of his *Curiosities of Literature* (1791), he discovered that his forte lay not in creative literature, but in the illustration of history and literary character, and to this he devoted himself. His style is elegant and pleasing, presenting the fruits of antiquarian research and study without their dryness and general want of connection. No writer is more instructively amusing or amusingly instructive than he. Lord Byron speaks of him as "that most entertaining and searching writer." D. died in 1848.

D.'s principal works are the *Curiosities of Literature* (1791-1823; new edition, with Life, Lond. 1851); *A Dissertation on Anecdotes* (1793); *Essay on the Manners and Genius of the Literary Character* (1795, 14th ed., 1850); *Inquiry into the Literary and Political Character of King James I.* (1816); *Commentaries on the Life and Reign of Charles I.* (1828-31); *Eliot, Hampden, and Pym* (1832); *Amenities of Literature* (1841)—for which he received from the university of Oxford the honor of D.C.L.

DISRUPTION. See FREE CHURCH OF SCOTLAND.

DISSECTION. See ANATOMY, in Law.

DISSECTION WOUNDS. The practical study of anatomy is attended with certain dangers, which, however, during the last quarter of a century have been much lessened. The atmosphere of the dissecting-room, now comparatively pure by the application of proper ventilation and other sanitary measures, was, less than a generation ago, too commonly loaded with noxious emanations, which more or less poisoned the blood of those who continuously inhaled it, and consequently produced nausea, sickness, diarrhea, a bad taste in the mouth, and other symptoms. D. W., which are always attended with a certain amount of risk, were rendered more dangerous by the low state of the system, induced by the depressing influence of the surrounding air. Now, probably in consequence partly of the purer air, and partly of the general and extensive use of antiseptic injections into the vessels of the subjects to be dissected, it rarely happens that severe symptoms follow a cut or puncture. We may incidentally remark that a puncture in making a post-mortem examination, when the body is comparatively fresh, is much more likely to be followed by serious consequences than a wound in the dissecting-room in which the bodies have been lying for some weeks.

In the great majority of cases, punctures or cuts in the dissecting-room are followed by no unpleasant results; it being an established rule, that every puncture should be carefully sucked as soon as it is observed, and then freely touched with nitrate of silver. When, however, the poison has been absorbed, and is going to act, the patient begins to have a feeling of general illness in less than 24 hours. He is low-spirited, faint, and chilly, and often complains of nausea. Then come rigors, intense headache, rapid and sharp (but weak) pulse, a coated tongue, vomiting (sometimes), and great restlessness.

The first local symptom is intense pain in the shoulder of the wounded side, which is followed by fullness of the neck and armpit, extending in the form of a doughy swelling down the side of the trunk, and assuming a pinkish tint.

The general symptoms increase in severity, the breathing becoming difficult, the pulse very rapid and weaker, the tongue dry, brown, and often tremulous when protruded, and the skin more or less yellow. The case may terminate fatally at or before this stage; or abscesses may continue to form, from which the patient may more slowly sink; or if he survive, the arm may remain stiff and useless, or some of the fingers may be destroyed by gangrene. In the article POISONS we have noticed the rapidity with which death occasionally ensues in these cases. The essential points of treatment are briefly summed up as follows by Dr. Druitt in his excellent remarks on this subject in *The Surgeon's Vademecum*: "The indications clearly are to eliminate the poison from the blood; to support the strength; and to relieve pain, and promote the discharge of pus or sloughs." The treatment, both general and local, is, however, so similar to that of pyæmia, that it is sufficient to refer our readers to that article.

As a precautionary measure in post-mortem examinations, the surgeon, especially if he be out of health, or if the patient have died from a disease of an erysipelatous character, should thoroughly anoint his hands with lard. Very thin india-rubber gloves have been recommended as a safeguard to dissectors; but they have not been found to answer; probably from the constraint to which they subject the action of the fingers.

DISSEISIN. See SASINE.

DISSENTERS, the common appellation of those who dissent or differ from the established church of their country in any of its doctrines, or in any part of its constitution, and therefore separate themselves from it. Although sometimes employed as a sufficiently appropriate designation of the sects which separated themselves from the general body of the church during the early and middle ages, the term D. belongs to modern times and Protestant countries; the claims of the Roman Catholic church, where dominant, having always been asserted in a manner incompatible with the existence of recognized religious dissent. The measure in which the rights of D. are conceded by law, may be esteemed a fair test of the religious liberty enjoyed in a country, and of the general enlightenment of a people. The term D. is of English origin and growth, although its almost exact equivalent may be said to have existed in Poland in the name *dissidents*, a term which first appears in the acts of the Warsaw confederation of 1573, and there denotes the Polish Protestants, in contradistinction to the members of the established Catholic religion. After 1632, the term dissidents was applied in Poland to all who were not Roman Catholics, such as Lutherans, Calvinists, Greeks, Armenians, etc.

In England, the term D. appears to have come into use in the 17th c., as synonymous with *nonconformists*; and from England its use was transferred to Scotland in the 18th c., after the Secession church had been founded in that country. It is usually applied to those who agree with the established church in the most essential doctrines, but differ from it on some minor point, or on questions of church-government, relation to the state, rites, etc., as in England to Presbyterians, Independents, and Baptists. The claim of the church of Rome to be regarded as the Catholic church prevents its members from accepting the name D., and others seldom seek to apply it to them. On somewhat similar grounds, it is rejected by *Episcopalians* in Scotland; and for very different reasons, to be found in the peculiar circumstances which attended their growth, the *Methodist* (q. v.) churches are seldom included in it, as ordinarily used. See ESTABLISHED CHURCH; NONCONFORMISTS; PURITANS; UNITED PRESBYTERIAN CHURCH; TOLERATION, etc.

The term D. is not strictly legal or ecclesiastical, those to whom it applies being usually described in legal language by a periphrasis. It is in Gt. Britain a convenient term to designate those Protestant denominations which have dissented from the doctrine and practice of the church as by law established. Immediately after the reformation, D., or nonconformists, as they were then called, were subjected to severe restrictions and penalties. "During the rebellion, the laws against Protestant sectaries were repealed; but they revived at the restoration; and the parliament of Charles II. proceeded to enforce systematically, by new measures of vigor, the principle of universal conformity to the established church."—*Stephen's Com.*, iii. 53. By 1 Will. and Mary, c. 18, the restrictions on D. were first relaxed, and certain denominations were suffered to exercise their own religious observances. From that period, various statutes have been passed, each extending in some degree the free exercise of religious opinion. At the present time, D. of all denominations are allowed to practice without restraint their own system of religious worship and discipline. They are entitled to their own places of worship, and to maintain schools for instruction in their own opinions. They are also permitted, in their character as householders, to sit and vote in the parish vestries. A dissenter, if a patron of a church, may also exercise his own judgment in appointing a clergyman of the church of England to a vacant living.

Since the beginning of the 18th c., the Presbyterian, Independent or Congregationalist, and Baptist denominations in England, have been associated under the name of the *Three Denominations*. This association was fully organized in 1727, and enjoys—like the established clergy of London and the two great universities—the remarkable privi-

lege of approaching the sovereign on the throne. Notwithstanding much weakness, arising from doctrinal and other differences, this association has contributed much to promote toleration and religious liberty in England.

DISSEPIMENT (Lat. *dissepio*, I separate), in botany, the partition between two carpels (q.v.) in an ovary or fruit composed of a number of carpels. A D. is formed by the union of the sides of two carpels. Sometimes dissepiments meet in the center or axis, completely dividing the ovary or fruit into cells; sometimes they are partial, appearing as mere projections from the outer walls of the ovary or fruit, and leaving it one-celled. Many ovaries and fruits exhibit partitions not formed by the union of the sides of carpels; these are sometimes called *spurious dissepiments*.

DISSOCIATION, or **DISASSOCIATION**, a word belonging to the nomenclature of chemistry, first adopted by Henry St. Clair Deville to express the influence of heat in the decomposition of compound bodies. In a paper presented to the French institute, 1857, he says that "by selecting a proper compound and heating it sufficiently, the distance between the molecules can be increased to such extent that they will separate into their elementary conditions." He holds that water may be thus dissociated into its constituent elements at the temperature of melted silver. Deville placed a tube of porous porcelain within a tube of glass, and provided each with a separate outlet. He passed hydrogen through the inner tube, and carbonic acid through the annular space; both the gases passed through the pores of the septum, and a combustible gas issued from the carbonic acid tube. Thus far the experiment was not new. He now placed the tubes in a furnace heated to between 1000° and 1300° C., and substituted steam for the hydrogen of the inner tube. Part of the steam was decomposed, the hydrogen passing through the porous matter to the outer tube, and a corresponding portion of carbonic acid entering the inner tube by the same route. Some hydrogen was lost by combining with oxygen of the carbonic acid, $\text{CO}_2 + \text{H}_2$ yielding $\text{CO} + \text{H}_2\text{O}$. From the inner tube came steam, carbonic acid, and oxygen, from which the oxygen was easily isolated; from the outer tube came steam, carbonic acid, carbonic oxide, and hydrogen, from which the hydrogen was also isolated. If the carbonic acid of the process were derived from the furnace which furnished the heat, and the steam were generated by the same heat, there results from the heating of water in this apparatus a certain quantity of separated oxygen and hydrogen, which might be used for the production of light and heat. By a modification of this process, sulphurous acid was separated, at 1200° C., into sulphur and anhydrous sulphuric acid; hydrochloric acid into hydrogen and chlorine; carbonic oxide into carbon and carbonic acid; and carbonic acid into carbonic oxide and oxygen. The economic value of this discovery is yet a problem. Lamy has applied it to the preparation of a pyrometer for showing high temperatures.

DISSOLUTION OF MARRIAGE. See **DIVORCE**.

DISSOLVING VIEWS are pictures painted upon glass, and made to appear of great size and with great distinctness upon a wall by means of a magic lantern with strong lenses and an intense oxyhydrogen light, and then—by removal of the glass from the focus, and gradual increase of its distance—apparently dissolved into a haze, through which a second picture is made to appear by means of a second slide, at first with a feeble, and afterwards with a strong light. Subjects are chosen to which such an optical illusion is adapted, such as representations of the same object or landscape at different periods. Dissolving views were invented and first exhibited as a popular entertainment in England.

DIS'SONANCE is the opposite of consonance, and is applied to those intervals in music whose relative proportions are to a certain extent unsatisfactory to the ear, and produce a degree of disquietude. In a special sense, the term dissonance is applied to the interval causing the unpleasant effect; which sound is not always, as some think, the upper note, but may be the middle or the lowest note. Many believe that the feeling of dissatisfaction produced by the dissonances of music, arises from the mind not being able without difficulty to comprehend at once the arithmetical proportions of the vibrations. The foundation of dissonance, however, is generally allowed to be more æsthetic than intellectual, as through the vibrations of a sounding body the air is put into a similar state of vibration, which is communicated to our ear, and so to our whole nervous system, through which we obtain the inward feeling representing the sound. In music, dissonance may be called a necessary æsthetic evil, which is used in the finest musical works for the purpose of producing pleasing contrasts, with their resolutions. In modern music, dissonance is divided into *essential* and *accidental*; the former arising fundamentally, the latter arising from passing notes, anticipations, suspensions, etc. See **HARMONY**.

DISTAFF, the staff on which the flax or wool is fastened, and from which the thread is drawn in spinning. A distaff of a very elegant construction is represented in art, and was no doubt generally used in antiquity. It is made of a cane-stick, the top of which is slit in such a manner as that the portions, when bent downwards, form a receptacle for the flax or wool. A ring was put over the top, for the purpose of keeping the divided ends of the cane together. The distaff was dedicated to Pallas; and the Fates are always represented with it, and engaged in spinning the thread of life. It has ever

been considered as the peculiar emblem of feminine as opposed to male occupations, and has come to be used figuratively for a woman.

DISTANCE. The limit of view in a picture, or *point of distance*, as it is called in perspective, is that portion of the picture where the visual rays meet; the *middle distance* being the central portion between the extreme distance and the foreground. The art of producing on the eye the effect of real distance, in so far as it is not accomplished by mere mechanical rules, is one of the most subtle branches of landscape-painting, and cannot be acquired otherwise than by long experience, and a careful study of the effects of light and shade.

DISTEMPER (Fr. *détrempe*), a coarse mode of painting, in which the colors—of a commoner kind than those usually employed for artistic purposes—are mixed in a watery glue, such as size and whiting. The chief purposes for which distemper is now used are scene-painting and staining-papers for walls. But it is known that the old masters frequently executed pictures and portions of pictures in distemper, and then oiled them, by which means they acquired the character of being painted originally in oil. It is said that Paul Veronese sometimes began his pictures in distemper, and finished them in oil, and that he frequently painted his skies in distemper. Distemper is often ignorantly supposed to be identical with fresco (q.v.). The difference is, that whilst in the former the colors are laid on a dry surface, in the latter they are put on wet mortar or plaster. See WIERTZ, ANTOINE.

DISTEMPER is a typhoid inflammation affecting the upper air-passages of young dogs, and resembling in many respects the strangles of young horses, and the scarlatina and other such complaints of children. Like these, it is generally contagious, occurs only once in a lifetime, runs a definite course, is accompanied by low fever and debility, and is most successfully treated by good nursing and attention to diet and regimen. The eyes are red, weak and watery; the nose dry and hot; draughts of air or movements of the animal readily excite sneezing or cough; there is dullness, fever, and loss of appetite. The thickened slimy mucus which the inflamed membrane, after some days, secretes, accumulates about the eyes and nostrils, and lodging in the bronchial tubes, prevents the free access of air, and the proper purification of the blood. Hence ensue distressed breathing, increasing weakness, and symptoms of nervous disturbance, such as staggering gait, chorea (q.v.), and fits. All dogs are liable to distemper, but the delicate, highly bred, and artificially treated varieties suffer most severely, and amongst them the mortality is very great. Bleeding, physicking, and all irritating and reducing remedies, must be carefully avoided, and a good dry bed in a comfortable airy place provided. The stomach, which is generally overloaded, should be relieved of its contents by an emetic, which, for an ordinary-sized English terrier, may consist of two grains each of tartar emetic and ipecacuanha, with eight or ten grains of common salt, given in a wine-glassful of tepid water. If no effect is produced, the dose must be repeated in twenty minutes. Constipation, if present, should be corrected by half an ounce each of castor and olive oil, to which, in large dogs, a few grains of gray powder is a useful addition. The febrile symptoms, if acute, may be alleviated by giving four times daily, in cold water, two drops of tincture of aconite, and five grains each of niter and extract of belladonna. Distressed breathing will be relieved by applying to the chest and sides, for an hour or two continuously, a thick flannel cloth, wrung at short intervals out of hot water. The throat may also be rubbed with hartshorn and oil, and the nostrils sponged and steamed occasionally. Give frequently, and in small quantities at a time, milk and bread, or any other such simple and digestible food; and when recovery is tardy, and weakness ensues, endeavor by nursing, tonics (q.v.), and stimulants (q.v.) to support the strength.

The term D. is sometimes applied to influenza (q.v.) in horses, and epizootic pleuro-pneumonia (q.v.) in cattle.

DISTICH (Gr. *distichos*, consisting of two rows or ranks) is the classical name given to any two lines, but especially to a hexameter and pentameter, making complete sense. It was much used by the Greeks and Romans as a vehicle for the expression of single thoughts and sentiments; and hence became almost exclusively employed for the classical epigram. The great poets of modern Germany, Goethe, Schiller, etc., have also shown a fondness for the D., and remarkable skill in the use of it. A collection of moral maxims in Latin, ascribed to a certain Cato, Dionysius (q.v.), are called *Disticha*, and were highly popular during the middle ages.

DISTILLATION is an important process in the arts. It consists essentially in converting a liquid into vapor in a close vessel, by means of heat, and then conveying the vapor into another cool vessel, where it is condensed again into a liquid. When applied to a solid, the process is called *sublimation*. The object of D. is to separate one substance from others with which it may be mixed. In D. proper, no chemical decomposition takes place; when any of the substances are decomposed, it is called destructive D. (q.v.). The possibility of separating substances by vaporizing them, depends upon the fact that very few substances are volatile at the same temperature. Thus, water boils or becomes rapidly converted into vapor at 212°, alcohol at 173°, sulphuric ether at 94.8, while oil of turpentine must be raised to 318°, and mercury to 662°; and some sub

stances, again, are altogether *fixed*. By applying the proper degree of heat, then, *and no more*, the more volatile of two substances may be expelled from the less volatile; and supposing the vapors of the two to rise mixed, as they are gradually cooled, that of the less volatile will be condensed before the other, thus affording another opportunity of separation.

It is often, however, not so easy to obtain a perfectly pure product by distillation as might at first appear, owing to another fact in chemistry—namely, that many bodies which, when pure, require a high temperature to vaporize them, become more easily vaporized when mixed with substances more volatile than themselves. Owing to this, it is impossible to obtain, by D. alone, alcohol perfectly free from water. The circumstance, on the other hand, is sometimes turned to good account in another way. By distilling, for instance, parts of plants with water, the essential oils pass over with the steam, and are then separated from the condensed water by other processes.

The applications of D. are numerous both in chemistry and in the practical arts. Pure water is obtained by D., the most of the substances dissolved in natural waters being fixed. Sea-water may thus be rendered drinkable, and there are apparatus for the special purpose. But wherever there are cooking-utensils, a distilling apparatus might be improvised. The pure water that descends from the clouds is produced in a way which is just the process we are speaking of on a large scale. See EVAPORATION. It is no figure of speech to say that the dews are “distilled.”

The extraction of zinc from the ore is a distillation; the metal, when reduced, passes over in vapor, and is condensed in a separate vessel. When the zinc ore contains cadmium, this metal, being more volatile, comes over in the first portions, and may be removed. When mercury is used to extract particles of gold from sand, the mercury is distilled off from the amalgam, leaving the gold, which is fixed. The mercury being condensed, is again ready for use.

The most extensive application of distillation is in the manufacture of intoxicating spirits, and in ordinary language this is the most common use of the word. Strictly speaking, indeed, the spirits are not produced by the act of distillation; that is done by the previous step of fermentation (q.v.); and distillation merely separates the spirits from the mixture in which they already exist. But it may be as well to give some account of the whole process under this head.

All the intoxicating drinks used in ancient times seem to have been the products of fermentation merely. The art, as it has been called, of evoking the fiery demon of drunkenness from his attempered state in wine and beer, is a discovery of modern times. It is first mentioned by an Arabian physician of the 11th c., Abulkasem, though the invention is attributed by some to the northern nations. The name *aqua vitæ*, given to distilled spirits by early physicians and alchemists, shows what an estimate they made of the discovery. Raymond Lully “declares this admirable essence to be an emanation of the divinity, an element newly revealed to man, but hid from antiquity, because the human race were then too young to need this beverage, destined to revive the energies of modern decrepitude.” Sadly have these anticipations been belied!

Spirits were first distilled from wine, and hence called spirits of wine. An endless variety of substances are now used in this extensive manufacture. Alcohol (q.v.) is the essential ingredient of all spirits, and it results from the decomposition of sugar, which, by the process of fermentation, is resolved into carbonic acid and alcohol. Sugar, then, is the direct source of alcohol, and accordingly all vegetable products containing sugar, such as grapes, the sugar-cane, sweet fruits, beet-root, etc., may be used in the manufacture of spirits. But there is another more abundant vegetable substance—namely, *starch*—which is easily convertible into sugar, and thus becomes indirectly a source of alcohol. In malt, and in germinating seeds generally, there is found a substance called *diastase* (q.v.). If a small quantity of this, or of an infusion of malt, be added to a paste of starch, it will in a short time become thin and sweet, the whole of the starch being transformed into sugar. See BEER. It is thus that grain of all kinds, potatoes, and other substances which contain little or no free sugar, are yet capable of yielding alcoholic spirits.

All substances, then, containing either sugar or starch, or both, will yield spirits. With sugar, the manufacture consists of two processes—fermentation and distillation. When starch is the original source, as is more commonly the case in the distilleries of this country, the first step is to convert it into sugar, or to *saccharify* it. This is the object of what is technically called *mashing*, which consists in mixing the materials in a triturated state with water at the temperature of about 160°. It is mostly from barley, oats, and rye that spirits are manufactured; wheat is less used, owing to its cost. Raw grain is ground to meal; malt is only bruised. A certain proportion of malt is always used, even in distilling from raw grain or potatoes, as the diastase of the malt is necessary to set agoing the saccharine fermentation. After being agitated for two or three hours, the saccharine infusion, called *wort*, is drawn off from the grains, and cooled. To this wort is now added a certain quantity of yeast or barm, which induces the vinous fermentation, and resolves the saccharine matter into alcohol and carbonic acid, accompanied by a rise of temperature. The alcoholic mixture which results is called the *wash*, and is now ready for distillation. This takes place in an apparatus called a still, or alembic (q.v.). In its older and simpler form, the still consists of a copper vessel, into

which the wash is put. This vessel is provided with a close head, terminating in a bent tube, which passes, in a spiral form (the worm), through the refrigeratory, filled with cold water. See STILL. When heat is applied to the still, the spirit begins to rise in vapor at 176° , along with more or less steam; these vapors pass through the worm, become condensed by the cold, and drop or trickle in the form of liquid into a receiver. The product of this first distillation in a simple still is called *low wines*. This is then redistilled at a lower temperature, in order to deprive it of part of the water and of the fetid oils that had passed over with the alcohol. To obtain great purity and strength, repeated distillation is used.

A great improvement in distilling was invented in 1801 by a workman of Montpellier, of the name of Adam. By making the vapors arising from the still pass through a series of winding passages, maintained at a determinate degree of heat, and deposit part of their water and other impurities, he was able to obtain from wine a spirit of any required cleanness and strength *at one operation*. This principle has been adapted, by Pistorius of Berlin (1817), to the distillation of the coarser washes of grain and other materials.

Absolute or anhydrous alcohol (q.v.) cannot be obtained by distillation alone. Rectified spirit, or spirit of wine, for burning in a lamp, still contains, when of ordinary strength, about 25 per cent of water. Alcohol is considerably lighter than water, its specific gravity being 793 (water, 1000). The stronger any spirit is, then, the less will be its specific gravity; and thus the strength of spirits may be ascertained by an instrument which measures their specific gravity, the *areometer* (q.v.) or *hydrometer*. The excise of Great Britain has established one degree of strength as the legal standard, and this is called *proof*. The specific gravity of proof-spirit is 918.6, and it contains nearly equal weights of water and alcohol.

If only alcohol and water passed over in distillation, all spirits, from whatever extracted, would be the same; but this is not the case. Brandy, which is distilled from wine, has a peculiar essential oil derived from the grape, and also some acid; rum is impregnated with an essential oil from the sugar-cane, and with other impurities; malt liquor has the essential oil of barley, etc. It is these essential oils that give to the various spirits their distinguishing flavors. Some of the oils and other impurities are disagreeable and positively noxious; and it is the objects of *rectifying* to remove these. The mellowing effect of age upon spirits is owing to the evaporation or spontaneous decomposition of the essential oils. Newly distilled spirits are in general fiery, and specially unwholesome.

Sugar, when fermented, resolves itself into nearly equal weights of carbonic acid and alcohol; a pound of sugar, therefore, should yield upwards of half a pound of proof-spirit. The quantity of spirit afforded by different grains depends upon the proportion of starch they contain: 100 pounds of starch is calculated to yield 35 pounds of alcohol, equal to nearly 8 gallons of proof-spirits. Of the various grains, wheat is the most productive. Taking the average of wheat, barley, rye, oats, and maize, 100 pounds of corn yield 40 pounds of spirit of specific gravity $942 = 3.47$ gallons proof. A distiller of malt whisky, says Dr. Ure, calculates on obtaining two gallons of proof-spirits from one bushel of malt in ordinary years. The highest yield is 20 gallons per quarter of 8 bushels.

The principal intoxicating beverages produced by distillation are: 1. Brandy (q.v.), which name is applied properly only to spirits distilled from wine. 2. Rum is manufactured from molasses and other uncrystallizable products of the sugar-cane. 3. Corn or malt spirit, under the various names of British spirits, gin, whisky, etc. The Dutch distillers give a peculiar flavor to their spirits (Hollands) by adding a portion of juniper-berries to the other ingredients. From the French name of the juniper, *genièvre*, come *geneva* and *gin*. 4. Spirits from various vegetable substances. In Germany, a great quantity of spirit is distilled from potatoes, which contain about five per cent of starch. Beet-root and carrots are also used in the same way. The Swedes make a kind of spirit from the sap of the birch, and the maple and other trees are turned to a similar account. We have, besides, cherry-brandy, peach-brandy, cider-spirit, etc. 5. Arrack (q.v.) is the East Indian name for all ardent spirits. See SPIRIT.

DISTILLATION, DESTRUCTIVE, is the term applied to the process of heating vegetable and animal substances in retorts or similarly closed vessels, at a temperature sufficient to decompose the original substance, and obtain therefrom products possessing different properties from the material which yielded them. Examples of this process are, the heating of coal in gas-works at a red heat, when it resolves itself into coke, which is left in the retort, and coal-gas, naphtha, tar, etc., which distill over into suitable receivers; the treatment of coal at and below a low red heat, when it yields much paraffine oil; the distillation of wood in close vessels, at a red heat, when charcoal is left in the vessel, and wood-vinegar, wood-spirit, tar, etc., pass over in vapor, and are condensed; and the heating of bones in similar retorts, when animal charcoal is left in the retort, and Dippel's animal oil distils over.

DISTILLED WATER is the condensed product obtained by the distillation of water. All natural waters, even rain-water, contain certain saline matters (common salt, etc.) in a state of solution, from which they can only be completely freed by the process of distillation. The characters of distilled water are, that it possesses a mawkish, insipid

taste, without odor or color, and when evaporated to dryness in a vessel, it ought to leave no residue. The other properties of distilled water will be noticed under **WATER**.

DISTILLED WATERS are obtained by distilling water along with the parts of plants containing essential oils. Rose-water and lavender-water are familiar examples.

DISTINGUISHED SERVICE ORDER, an order instituted in 1886, and conferred primarily upon British naval and military officers who have been honorably mentioned in despatches. The badge is a gold cross enameled white, bearing the imperial crown on a red ground on the obverse, and the cipher V. R. I. on a red ground on the reverse, and is worn, suspended from a red riband, on the left breast.

DISTORTION. The rules of perspective impose certain conditions in the delineation of natural objects, and when the image formed by a lens on the focusing screen of a camera obscura does not fulfill those conditions, it is said to be distorted. The effect of distortion is to render all straight lines, which do not pass through the center of the lens, curvilinear, and also so to alter the relative proportions of objects in the picture as to be opposed to the principles of true perspective.

DISTRAIN. See **DISTRESS**.

DISTRESS is defined to be "the taking of a personal chattel out of the possession of the wrong-doer into the possession of the party injured, to procure a satisfaction for the wrong committed." (Stephen's *Com.*, III. 342.) It was a remedy of feudal law, inseparable from fealty to the lord, and incident to every service. Now it is practically enforced chiefly for non-payment of rent, or of certain public dues, and upon cattle straying upon land not belonging to their master. The English law of distress has been generally adopted in the United States, with some local difference. It does not seem to be very popular, however, as a means of collecting rents, as it places the landlord in a better position than the other creditors. In New England distress has given place to an attachment on *mesne profits*. In New York it is expressly abolished by statute, and in North Carolina is held to be inconsistent with the spirit of the laws and not to exist in that state. The law of Louisiana permits the landlord to follow his tenant's goods for fifteen days after removal from the premises. There are some articles, however, which cannot be distrained under the law of any of the states. For example, where the proprietor is compelled by necessity to place his goods on the land, or where he does it for commercial purposes; as, in the first instance, the goods of a traveler at an inn, or in the second, goods deposited in a warehouse on storage. Beasts of the plow, implements of trade, and similar chattels in actual use are often exempt. Goods when taken under distress are properly advertised and sold at public auction, and the overplus, if any, returned to the tenant.

DISTRIBUTIONS OF LIFE, ANIMAL AND VEGETABLE. In the light of modern discoveries, the interdependence of every part of nature is clearly revealed, and the life of the world is seen to be one symmetrical organism, the different parts of which are distributed in time and in space by the operation of laws as yet but imperfectly understood. Animals and plants, though sustaining very close relations to each other, form two distinct branches of study, whose phenomena require to be carefully discriminated. Animals are divided into terrestrial and aquatic, the first class being the most important and best understood. Their distribution is considered in two aspects—the climatical and the geographical—which present distinct and sometimes conflicting classes of facts. Of the two, the geographical conditions are the most important. The range of animals is determined in some degree by the altitude or depression of the land-surface on which they dwell. A very important element to be considered, in determining the causes of the distribution of animals, is found in their different powers of dispersal or migration, some having no means of passing over seas, or lofty mountains, or arid deserts, while others, especially the insect tribes, are not thus limited. But migrating animals can not always maintain themselves in a new region, the organisms in previous possession of the soil being too strong for them. The power of adaptation is generally inferior to the power of dispersion. The nature of the vegetation determines the range of some animals. Deserts, marshes, and forests have each their peculiar inhabitants, which do not often stray beyond their limits. Tropical forests especially supply the wants of a great number of peculiar form of life. Mountains of great height and in unbroken ranges form a barrier to the migration of many groups, but their geological age is limited, while oceans, owing to their great antiquity, have separated the faunas of different continents for countless ages. The zoological regions of the earth, according to the best authority, are six in number, each one having marked and distinct peculiarities. The last of these divisions is the Nearctic, which comprises all temperate North America, and is subdivided into the Californian, the Rocky mountain, the Alleghany, and the Canadian regions. The peculiar fauna of the Nearctic region is best represented in the United States, where many peculiar genera of mammalia, birds, reptiles, and insects are found. The distribution of the higher animals during the post-tertiary and tertiary periods is a subject of very deep interest. It is found that, during the post-tertiary period, the reindeer and the antelope inhabited France; elephants and rhinoceroses roamed all over Europe; in North America there were lions, horses, camels, bison, elephants, and mastodons. This period was characterized by great movements or migrations of the higher animals, and by the extinction of many huge creatures belonging to almost every order of mammalia,

and several orders of birds. The tertiary fauna of North America, compared with that of Europe, exhibits proof of a former communication between the two northern continents. From the knowledge now possessed of the extinct fauna of most of the great continents, scientists can approximately determine the original birthplace of some now widely distributed groups. The distribution of the marine animals also presents many interesting phenomena, but they cannot be noticed here. The geological record on which depends our knowledge of the distribution of animals in respect to time, though it reveals much important truth, is yet very imperfect. The evidence, so far as it goes, tends, it is thought, to confirm the doctrine of evolution.

The distribution of vegetable life is involved in much obscurity. For a long time the investigation of the subject was pursued under great disadvantages, and with very unsatisfactory results. The writings of Darwin, Hooker, Gray, and Bentham, however, have thrown much light on the subject. Bentham recognizes three ancient floras—the northern, the tropical, and the southern. The northern is divided into that of the old and new world by the severance of North America from Northern Asia, and by the barriers of the Rocky mountains. The divergences in the flora of these two regions originated in distance, but have been greatly increased by isolation. Lesquereux believes that the origin of the present American flora is American. There is a strong analogy, however, between it and the miocene flora of Central Europe, and the American element in the latter is supposed to be derivative, confirming the observation of Gray that plants tend to migrate from east to west, rather than from west to east. The boundaries of the northern flora, under the influence of climatic variations, have also undergone longitudinal changes. The northern flora, by the combined influence of physical and genetic causes, has undergone a specialization into three distinct groups—the Arctic-Alpine, the temperate, and the Mediterranean-Caucasian. The southern flora is still more complex in its relations, and is described in five types—the Antarctic-alpine, the Australian, the Andine, the Mexico-Californian, and the South African; the latter, though limited in extent, being the richest of all. The tropical flora has hardly as yet been investigated.

DISTRIBUTION, STATUTE OF, the distribution of the personal property of any person dying without a will by order of the court having authority. Real property is said to be acquired by descent, and goes to the heirs; personal property is distributed to the next of kin. In a large proportion of the states the rules of distribution of personal property follow the laws of descent of real estate, in others there are important distinctions. In N. Y., for example, it is provided that after the payment of debts, etc., the residue shall be distributed as follows: One-third to the widow, and the residue equally among the children. If there be no children, one-half to the widow, and the other half to be divided among the next of kin. If there be no children, parents, brothers, or sisters, then the widow takes the whole. If there be no widow, the children take the whole; if they too are wanting then the property is divided among the next of kin. The statute is very full and provides for a very large variety of contingencies, and reference should be made to it. 3 N. Y. Rev. Stat., 6th ed., p. 104.

DISTRIBUTION OF SPECIES. See SPECIES.

D'ISTRIA. See GHICA, HELENA.

DISTRICT ATTORNEY OF THE UNITED STATES, is a member of the bar appointed to try civil and criminal suits for the government in the circuit and district courts of the United States, and required by law to report his doings to the attorney-general in Washington. He has a merely nominal salary, but receives fees, often large, prescribed by act of congress. The office is one of responsibility and honor.

DISTRICT, CONGRESSIONAL, is that portion of the territory of a state the voters in which are by law entitled to choose once in two years a representative to the congress of the United States. The number of such districts varies from time to time, being fixed by congress immediately after each decennial census. (See CONGRESS, UNITED STATES.) The boundaries of the district in each state are determined by the legislature thereof. The ratio of representation (number of inhabitants required for a district) under the census of 1890 is 173,901; the number of districts is 356. The ratio is raised after each census, on account of increase of population, as otherwise congress would be inconveniently large. The time may come when a member of congress will represent a million of people. The constitution declares that each state shall have at least one representative, even if its whole population should at any time come short of the prescribed ratio. Under this rule the state of Delaware with a population of only 168,493 has one representative in the lower house of congress, while in the senate its representation is equal to that of any other state.

DISTRICT OF COLUMBIA (see WASHINGTON), a small territory between Maryland and Virginia selected in 1800 as the site for the national capital of the United States. The selection of a place for the seat of government provoked the first discussion of a sectional nature after the adoption of the federal constitution. The government was organized at New York, Mar. 4, 1789, and congress met in that city until 1791. In 1790, after a long discussion, a bill was passed providing that the seat of government should be changed to Philadelphia, where it should remain from Dec., 1790, to Dec., 1800, at which time it should be upon "a district of territory not exceeding 10 sq. m., on the

river Potomac, between the mouth of the eastern branch and Conogocheague." The land was on both sides of the Potomac, and was ceded by the owning states with the condition that congress, or the United States, should have exclusive control forever. Maryland ceded 64 sq. m., or the whole of Washington co.; and Virginia ceded 36 sq. m., which was Alexandria co.; but in 1846, the Virginia portion was returned to that state, as no part of the government establishment had been erected s. of the river. It is said that the site of Washington, or near there, was a favorite meeting-place for Indians. Among the earliest white settlers was an Englishman named Pope, who bought land and named the stream flowing through it the Tiber, and to the eminence on which the United States capitol now stands, he gave the name of Capitoline hill, calling his whole plantation Rome, and signing himself "Pope of Rome." About 60 years before the revolution, one of the ancestors of Daniel Boone owned the land now occupied by the city of Georgetown, on which he laid out a town of the same name. The first movement towards selecting a permanent seat of government was in 1783, when, through acts of mob violence, congress was forced to adjourn from Philadelphia to Princeton, New Jersey. At that time Elbridge Gerry of Massachusetts offered a resolution (adopted, but afterwards repealed) providing for the selection of a site on the Delaware, and one near the falls of the Potomac, his idea being to have a northern and southern capital. The authority to select a site was given, finally, in the federal constitution. The government title to the territory was perfected, and buildings suitable for the accommodation of congress and the executive departments were ready at the prescribed time, and on the first Monday of Dec., 1800, the capital was fixed in the federal city called Washington. For many years afterwards, Washington was but the skeleton of a town, and from its ambitious proportions was nicknamed "the city of magnificent distances," while even the poets flouted its pretension with the line, "And what was Goose Creek once is Tiber now." In 1814, the British took possession of the territory, and burned the capitol and other public buildings. Soon after that war, the District of Columbia began to improve in population and industries. When the civil war began, strong fortifications were erected for the defense of Washington, which was several times menaced or in danger, but never actually attacked.

The district of Columbia was governed directly by congress until 1871, when the people of the district were given the privileges of self-government as a regular territory; A governor and secretary were appointed, and a delegate to represent the territory in congress; also a legislature of 11 councilmen and 23 delegates, these last elected by the people annually. Two of the councilmen were required to be residents of and appointed from Georgetown, and 2 from that part of the district outside of Georgetown and Washington. In 1874 the government was placed under control of 3 commissioners appointed by the pres. and approved by the senate. The citizens have no voice in the appointments to office within the district, and have no vote in district or national affairs.

In 1896, there were in the district 5 daily and 30 weekly newspapers, 25 monthly, 2 semi-monthly, and 6 other periodicals, 68 in all. Children between 6 and 17 are within school age, and in 1895 there were 68,670 in the district; 41,557 enrolled; average attendance, 33,844; school property valued at \$3,260,027. The colleges are: Columbian university (Bap.); Gonzaga college (R. C.); National Deaf-Mute college (non-sect.); and Howard university (non-sect., though under Con. and Pres. patronage); all at Washington; Georgetown (R. C.) university. Both sexes are admitted to Howard university, and colored students are admitted to the theological department. The Baptists have also a school (Wayland seminary) in Washington; there are medical departments in nearly all the colleges, and also a National college of pharmacy. All except Gonzaga and the Deaf-Mute college have law departments. There are over 60 public libraries, with an aggregate of over 1,515,000 volumes, and more than 600,000 pamphlets. Thirty-five libraries belong to the government. Pop. '90, 230,392.

DISTRICT COURTS OF THE UNITED STATES are tribunals subordinate to the circuit courts. Each of the nine judicial circuits (corresponding to the number of justices of the supreme court) is divided into a larger or smaller number of districts. In some instances a district embraces the whole territory of a state; in others, states are divided into two or more districts. In one instance a single judge serves three, in others, two districts. With these exceptions, there is one judge for each district. When a circuit court is held within the limits of a judicial district, the district judge sits with the judge of the supreme court appointed for that circuit. See JUDICIARY IN THE UNITED STATES.

DISTRICT, SENATORIAL. A territory, the electors of which are entitled to choose a representative in the upper branch of a state legislature. The U. S. senators are chosen by the state legislatures, two for each state, without reference to population; hence the term district is in no way applicable to them.

DISTRICTS, MILITARY, are certain regions into which the United Kingdom is divided for military purposes, to facilitate command and organization. Before Mr. Cardwell's act of 1872, England was divided into four districts, and Ireland into five, while Scotland formed one. Now there are nine general districts in England—namely, the northern, with Manchester as its headquarters; the eastern, with Colchester; the southern, Portsmouth; the south-eastern, Dover; the home district, London; the Chatham; the

Woolwich; the Aldershot. In Ireland there are four—Belfast, Dublin, Cork, and the Curragh. Scotland is still one district, with Edinburgh as head-quarters. Jersey is a military district, and Guernsey and Alderney form another. See DIVISION (military).

DISVELLOPED, or **DEVELOPED**, is applied to the colors of a regiment or army, which are said, heraldically, to be disvelloped when flying.

DITCH, in agriculture, is a trench usually made along the sides of fields, so that all the drains may be led into it. A hedge is often planted along the side, and the two form a better fence for cattle. In cold, undrained lands, the earth thrown out of the trench forms a mound of dry earth, which is particularly serviceable for the growth of thorn-hedges. Accordingly, this is the common mode adopted in planting hedges in such districts, where the subsoil is often close, tenacious, and not well suited for their growth. Various forms of ditches are made; sometimes a double D. is adopted, and the hedge planted between. In arable lands, however, since the general use of small and large pipes, ditches have been converted into underground drains, which has effected a great saving of land, as well as giving to the fields a tidy appearance.

DITCH is one of the most important of the defense-works of a fortified place. It is a broad and deep trench, that may either be kept dry or filled with water; in practice, it is generally dry.

In permanent works, such as the regular fortifications of a town, the *rampart* and the *ditch* are the most important; the former being inside the latter, and formed mainly of the earth excavated from it. The D. is often 120 ft. wide, 12 ft. deep below the natural level of the ground, and 24 ft. beneath the parapet of the rampart. See **FORTIFICATION**.

DITHYRAMBUS, originally a surname of Bacchus, of uncertain derivation and meaning, was subsequently applied to a species of lyric poetry cultivated more particularly at Athens, and characterized by loftiness and vehemence of style, which, however, at a later period, degenerated into bombast and extravagance. The D. was originally a passionate hymn, sung by one or more revelers to the music of a flute; but Arion (q.v.) invented for it a regular choral or antistrophic form. It is this form which is generally spoken of as the dithyramb. It subsequently received various alterations, but no specimens of it have survived.

DITMARSH, NORTH and SOUTH (*Norder and Süder Dithmarschen*), the name given to the western district of the German duchy of Holstein, lying between the Eider and the Elbe. The entire area is 500 sq. miles. In old German times, D. formed a part of Saxony beyond the Elbe, and is worthy of special notice, because the inhabitants have preserved to the present day the peculiarities of antiquity. It has its own collection of laws, known as the *Ditmarsh Land-book*, which originated in 1321 from 48 judges; was altered in 1447, first printed in 1497, amended in 1567, and finally enjoined anew in 1711. Whatever authentic notices, traditional and otherwise, we possess of D., we owe to Joh. Adolphi (b. 1559, d. 1629), whose *Chronik des Landes D.* (Ditmarsh Chronicle), written in the Lower Saxon dialect, was published in the original text, with 23 dissertations by Dahlmann (Kiel, 1827).

DITTANY, *Dictamnus*, a genus of plants of the natural order *rutaceæ*, having a short 5-partite calyx, 5 somewhat unequal petals, 10 stamens, and 5 1 to 3-seeded follicular capsules cohering at the base. The COMMON D., also called BASTARD D., or FRAXINELLA (*D. albus*), a native of sunny mountains and rocks and dry mountain-forests of the s. of Europe, especially in calcareous soils, is very generally cultivated as a garden-flower. It is a perennial, with stem $1\frac{1}{2}$ to 3 ft. high, perfectly unbranched, bearing a few pinnated leaves, which have 3 to 5 pair of leaflets and an odd one, and terminating in a beautiful erect raceme of 10 to 20 flowers. The flowers are of a fine rose color, with darker veins, more rarely white. The plant diffuses a powerful fragrance from its numerous oil-glands when in flower, and during dry, hot weather exhales such a quantity of volatile oil that its sudden combustion makes a slight flash when a candle is brought near it on a warm summer evening. The root is thick, white, and very bitter, and was formerly in high repute in medicine as a tonic stimulant, but is now neglected.—D. of Cretæ, used as a febrifuge, is a very different plant (*Origanum dictamnus*), a kind of marjoram (q.v.).

DIT'TAY, a technical term in the criminal law of Scotland, now little used, signifying the ground of indictment or substance of the charge. By *taking up dittay* was understood the collecting of information in order to trial, which is now effected by what is called a precognition.

DITTEE'AH. See **DUTTEEAH**.

DITTON, HUMPHREY, 1675–1715; an eminent English mathematician, for some years a dissenting clergyman. The influence of Sir Isaac Newton secured for him a professorship in the new mathematical school at Christ's hospital, where he remained through life. He and Whiston published a new method for determining longitude at sea, but it was rejected by the board of admiralty. Ditton was the author of several mathematical works.

DIU, a seaport, situated at the eastern extremity of an island of the same name off the s. coast of Guzerat, in Hindustan; is well fortified, having a tolerably safe harbor, with a general depth of three or four fathoms. The anchorage, however, is said to be gradually becoming shallower. The place has been in possession of the Portuguese ever since 1515; but, from its detached and isolated position, its trade is of little consequence. The area of the island is about 62 sq. m.

DIURETICS, medicines having the property of increasing the secretion or excretion of urine, and on this account much employed in dropsies, as well as in a variety of other diseases. The principal diuretics are the salts of potash, especially the nitrate, acetate, and bitartrate (cream of tartar); squill in powder, vinegar, or sirup; digitalis or fox-glove, in powder or infusion; the decoction or infusion of broom-tops (*scoparium*): the decoction of the American winter-green or pyrola; the alcohols and ethers, with most of the volatile oils, especially that of juniper, as in gin; the berries of the common elder; the tincture of cantharides or Spanish flies; turpentine, etc. The last named (from the alcohols onwards in the above enumeration) are more or less irritating in their effects on the urinary organs, and should not be used without due consideration as to the requirements of the particular case. Cream of tartar and the broom-decoction form one of the safest and best diuretic mixtures which can be employed for domestic purposes; or cream of tartar may be given alone, either dissolved in hot water, and allowed to cool, or in substance along with sirup.

DIURNAL MOTION is the apparent daily motion of a heavenly body caused by the rotation of the earth on its axis. See **AXIS**; **EARTH**; **PLANETS**.

DIVAN is a Persian word, having various significations. It is used in the sense of a muster-roll, a register of payments or account; it is also applied to a collection of poems or songs by one and the same author. Goethe uses it in this sense in his *Westöstliche Divan*. Divan means next an administrative board; the highest council of state at Constantinople is called *Divani humâjûn*, most illustrious divan. Finally, divan is the name for the state or reception room in palaces and the private houses of the richest citizens. Along the walls of the room are ranged low sofas, covered with rich carpets, and provided with cushions. Hence the name **divan** is used for a kind of sofa.

DIVEL ON THE NECK, an instrument of torture used against the Lollards. It is thus described by Fox, in his *Acts and Monuments*: "Certain strait irons called the divel on his neck being after an horrible sort devised, straitening and winching the neck of a man with his legs together, in such sort as the more he stirreth in it, the straiter it presseth him, so that within three or four hours, it breaketh and crusheth a man's back and body in pieces."—Cowel's *Interpreter*.

DIVER, or **LOON**, *Colymbus*, a genus of birds of the family *colymbidæ* (q. v.), having a strong, straight, rather compressed pointed bill, about as long as the head; a short and rounded tail; short wings, thin compressed legs placed very far back, a *d* the toes completely webbed. They fly well, but are particularly expert in diving. They prey upon fish, which they pursue under water, making as much use of their wings as of their legs and webbed feet in their subaqueous progression. They are scarcely capable, however, of walking on land, and the name *loon* is supposed to refer to this incapacity, and to be from the same root with *lame*. The **GREAT NORTHERN D.**, or **LOON**, also called the **IMMER** or **EMBER GOOSE** (*C. glacialis*), is a bird about 2½ ft. long, exhibiting no little beauty of plumage; the upper parts black, spotted with white; the head black, with tints of green and blue; the belly white. It is a winter visitant of the British coasts, even to the furthest s., and is occasionally seen in inland districts; is found in like manner in most parts of Europe, the n. of Asia, and North America, as far s. as Texas, but it breeds chiefly in the more northern regions, as Labrador, Iceland, and Spitzbergen. It is not exclusively marine, being often seen on large rivers, and making its nest on the shores of fresh-water lakes. Its cry is very peculiar and wild, has been likened to the howl of a wolf, and is in some countries superstitiously regarded as ominous of evil. It is easily tamed, and becomes very familiar. The **BLACK-THROATED D.** (*C. Arcticus*) is another northern bird, of similarly wide geographic distribution, but much smaller size, being only about 26 in. in length. It is found at intervals distributed round the coasts of Britain, and it occasionally breeds in the fresh-water lochs of the n. of Scotland. The **RED-THROATED D.** (*C. septentrionalis*) is also found in all the northern parts of the world, is more common in Britain than either of the other species, and is the bird generally called loon on the British coasts. See *illus. DEER*, vol. IV.

DIVERGENT. See **CONVERGING**.

DIVERTIMENTO, or **DIVERTISSEMENT**, a species of musical composition consisting of different movements, arranged in an easy style for one or more instruments, but not so elaborately wrought out as the sonata, or other more regular compositions. The D. has generally no fixed character, being merely a musical picture without any attempt at artistic effect, or other aim than to please the ear, and may be said to take its place between the *etude* and the *capriccioso*. The D. was greatly in vogue during the last half of the 18th c.; until then, the word had never been used as a musical term.

DIVES is a Latin word meaning *rich* or a *rich man*. It has been incorrectly supposed to be a proper name in the story of the rich man and Lazarus in Luke xvi. The mistake is thought to have occurred from an old picture upon the subject, having the title in Latin *Dives et Lazarus*, and some illiterate person supposed the first word to be a proper name the same as the last word.

DIVIDEND, the sum apportioned to creditors from the realized assets of a bankrupt estate, and which is at the rate of so much per dollar of the claims. The half-yearly interest on the public funds, and periodical profits on shares in joint-stock undertakings, are also called the dividends, the latter being usually declared half-yearly, by order of the directors. Occasionally the dividends do not exhaust the profits, and the surplus is allowed to accumulate, until it is paid to the shareholders as an extra D. called a bonus.

DIVIDING ENGINE. See GRADUATION.

DIVIDIVI, or **LIBIDIBI**, the curved pods of *cæsalpinia coriaria* (see **CÆSALPINIA**), a tree which grows on the coasts of Curaçoa, Carthage, and other parts of tropical America. They have been long used there for tanning, but have recently acquired importance as an article of commerce. D. is one of the most astringent substances known.

DIVINATION (Lat. *divinatio*) is the act of discovering the hidden, but more particularly the future, in a supernatural way. Men have at all times set their imaginations above the causes of nature, and by a curious subjective process, have endeavored to draw out of themselves what could in reality be only derived from a study of the laws of nature. Thus, there have been instituted systems of superstition among almost all nations of the world at one period of their history, which the march of scientific discovery and the beneficent influences of a rational religion have failed to wholly eradicate, so that, even among comparatively enlightened peoples, there lurks a deep substratum of this old-world feeling. A more special use of the term is to denote fortune-telling or sorcery (middle-age Latin *sortiarius*, one who reads the future by means of lots or *sortes*). It was a maxim with the nations of antiquity, that if there are gods, they care for men; and if they care for men, they will send them signs of their will. This, with some variations, has been a universal sentiment in all ages and countries. But it was the first step in this journey which presented the whole difficulty. How was man to know the will of the gods? The variety of answers which this question has drawn forth constitutes the history of divination. Thus, among the Greeks, the word for D. was *mantikê*, which signified more than the Latin *divinatio*; inasmuch as it was applied to any means by which the Deity discloses himself to man, while the Latin word denoted more the power which man is supposed to possess of discovering the future. With the Greeks, the seer was passive; with the Romans, he was active. See **SEER** and **ORACLE**. Astrology was a favorite method of D. among the ancient Chaldeans, as well as in the middle ages. *Auguries* and *auspices*—both words derived from *avis*, a bird—were systems brought to perfection by the Romans as means of knowing the will of the gods. See **AUGURIES** and **AUSPICES**. The sacrifice of beasts, besides, the casting of the horoscope, and the observing of the constellations, were all favorite modes of guessing at the future practiced by the Romans. But the belief was not confined to the old world. The Araucanians, a warlike nation of South America, seem to have placed as implicit faith in the D. of birds as did the Romans, and they practiced this art in a way not very dissimilar. Even among ourselves, the merry-thought bone of fowls is thought to possess a curious virtue.

An extensive set of omens have been taken from observing what first happens to one, or what animal or person one meets first in the morning, or at the commencement of an undertaking—the *first-foot*, as it is called. To stumble, has been universally held to presage misfortune. Some semblance of a reason might be found for this belief, inasmuch as stumbling may be supposed to indicate that that self-possession and conscious courage, which are in themselves half a victory over circumstances, are lacking—the want of them, therefore, being half a defeat; but in most cases the interpretation seems altogether arbitrary. The dread of a hare crossing the path seems to be widely prevalent; while to see a wolf is a good omen. This feeling is probably a remnant of warlike times, when the timid hare suggested thoughts of cowardice and flight; while the bold wolf, sacred to Odin, was emblematic of victory. The character of the hare for being unlucky is also connected with the deep-rooted belief, that witches are in the habit of transforming themselves into hares. That to meet an old woman is unlucky, is another very general belief; arising, without doubt, from the same causes that lead to their being considered witches. In some places, women in general are unlucky as *first-foot*, with the singular exception of women of bad reputation. This belief prevailed as far back as the age of Chrysostom. Priests, too, are ominous of evil. If hunters of old met a priest or friar, they coupled up their hounds, and went home in despair of any further sport that day. This superstition seems to have died out, except in the case of sailors, who still consider the clergy a "kittle cargo," as a Scotch skipper expressed it, and anticipate a storm or mischance when they have a black-coat on board. This seems as old as the days of the prophet Jonah.

The observation of *lucky* and *unlucky* days was once an important matter, and was often the turning-point of great events. It is now confined to the one subject of mar-

riage. In fixing the wedding-day, May among months, and Friday among days, are shunned by many people both in the higher and lower orders; for in this matter, which is the exclusive province of women, and in which sentiment and fancy are in every way so much more active than reason, the educated and uneducated are reduced to a level. Perhaps half the superstitious beliefs that yet survive among civilized and Christian communities, group themselves round the subject of love and marriage—of such intense interest to all, yet so mysterious in its origin, and problematical in its issue. The liking or passion for one individual rather than any other, is so unaccountable, that the god of love has been fabled blind; it is of the nature of fascination, magic, spell. And then, whether happiness or the reverse shall be the result, seems beyond the reach of ordinary calculation. All is apparently given over to mystery, chance, fortune, and any circumstances may, for what we know, influence or indicate what fortune's wheel shall bring round. Hence the innumerable ways of prognosticating which of two or more persons shall be first married, who or what manner of person shall be the future husband or wife, the number of children, etc.

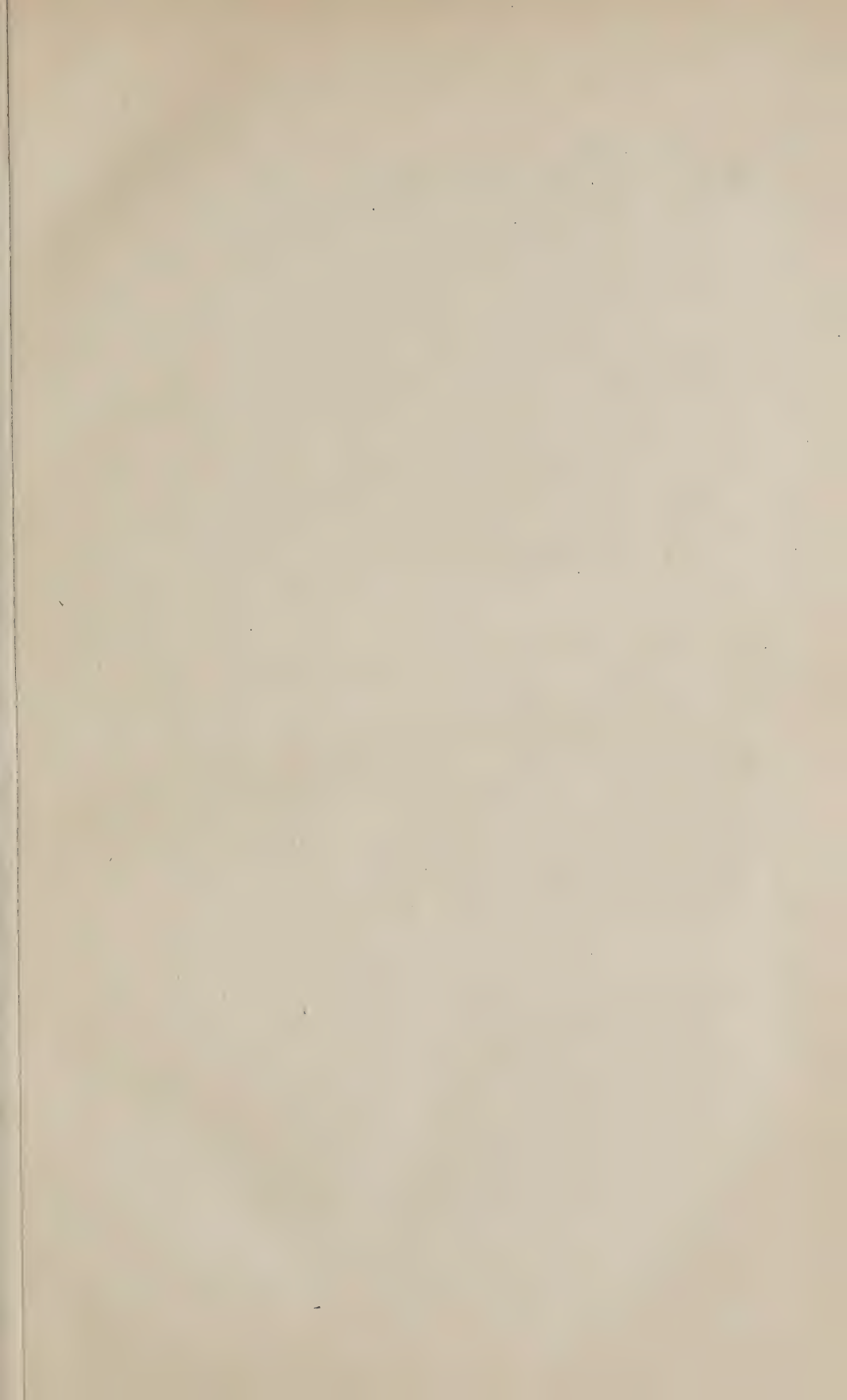
Sneezing, likewise, has long been looked upon as supernatural, for this reason, that it is sudden, unaccountable, uncontrollable, and therefore ominous. The person is considered as possessed for the time, and a form of exorcism is used. A nurse would not think she had done her duty if, when her charge sneezes, she did not say: "Bless the child," just as the Greeks, more than two thousand years ago, said: "Zeus protect thee."

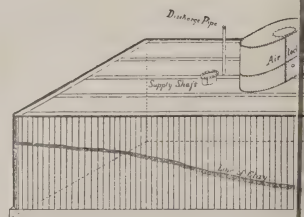
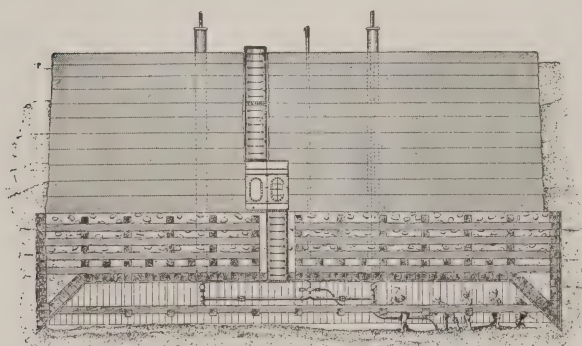
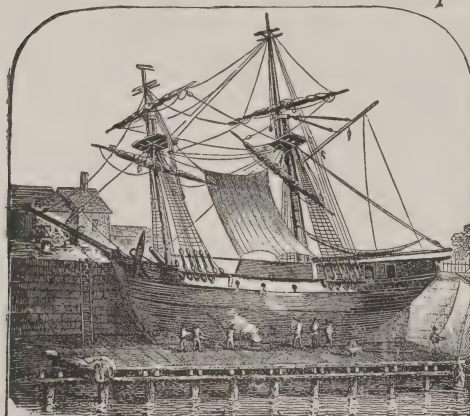
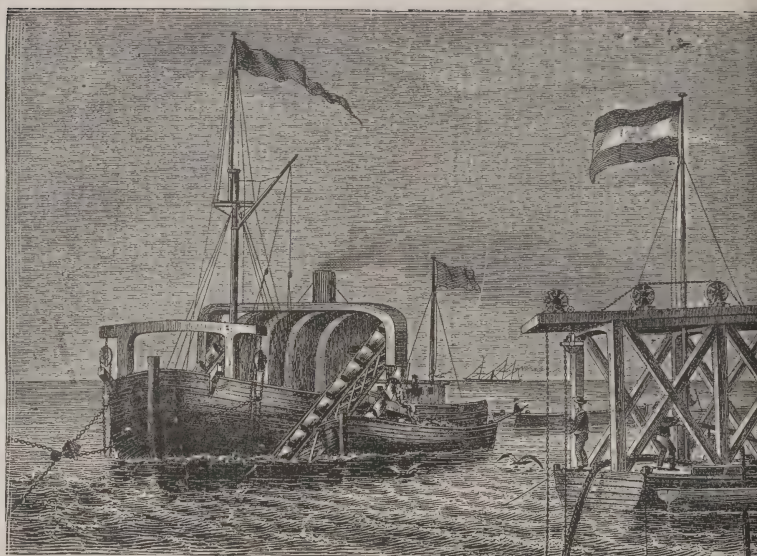
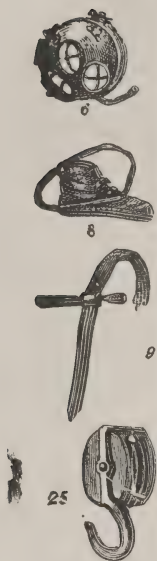
One general remark, however, it is important to make in regard to omens. An *omen* is not conceived to be a mere sign of what is destined to be; it is conceived as causing in some mysterious way the event it forebodes; and the consequence, it is thought, may be prevented by some counteracting charm. Thus the spilling of salt not only forebodes strife, but strife is conceived as the consequence of the spilling of the salt, and may be hindered by taking up the spilled salt and throwing it over the left shoulder.

An important exercise of the diviner's art is to determine the innocence or guilt of parties. This will be treated under ORDEAL. But it would be impossible to enumerate the endless modes of D. for which learned names have been found. Some of the principal are *axinomancy* (q.v.), *belomancy*, *bibliomancy* (q.v.), *botanomancy*, or D. by means of plants and flowers (it was practiced by the ancients, who were wont to bruise poppy-flowers betwixt their hands, under the conviction that they could thereby discover their loves. Hence Theocritus calls the poppy *teliphilos*, quasi *deliphilos*; i.e., a tell-love. Goethe has made a beautiful use of another form of this superstition, which existed among the Teutonic races no less than among the old Greeks. The child-like Marguerite, in *Faust*, seeks to discover whether or not Faust loves her by plucking the leaves from a star-flower, murmuring alternately, "He loves me," "He loves me not," and finds to her joy that the last leaf comes away while she is saying "He loves me"); *capnomancy* (q.v.), *cheiromancy* (q.v.), *coscinomancy* (q.v.), *crystallomancy* (q.v.), *cup*, *divination* by (q.v.); *geomancy* (this was anciently practiced by casting pebbles on the ground, from which conjectures were formed; but the Arabian geomancy was more recondite, being founded on the effects of motion under the crust of the earth, the chinks thus produced, and the noises or thundering heard); *hydromancy*, D. by water or by a mirror, in which the diviner shows the image of an absent person, what he is doing, etc. (this mode of D. plays an important part in the Arabian romances); *lithomancy*, a species of D. performed by stones, but in what manner it is difficult to ascertain; *oneiromancy* (see DREAMING); *pyromancy*, or D. by flame (it was common among the Greeks and Romans: if the flame of the sacrifice was vigorous and quickly consumed the victim, if it was clear of all smoke, and did not crackle, but burn silently in a pyramidal form, the omen was favorable; otherwise, it was not); *rabdomancy* (see DIVIN-NG-ROD); and *teraphim* (q.v.). See SUPERSTITION.

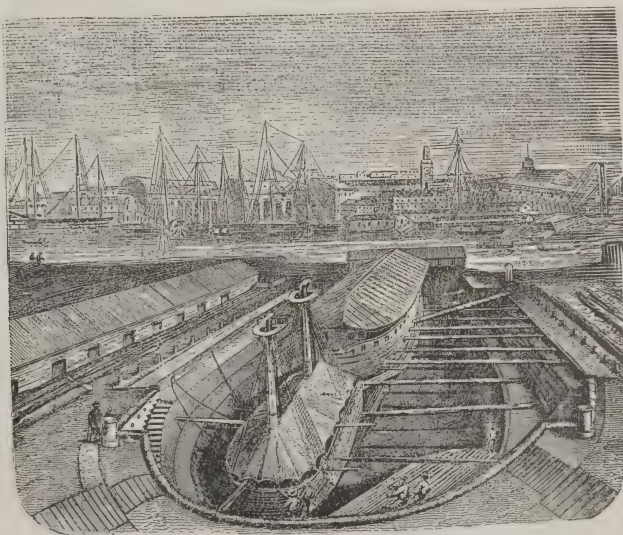
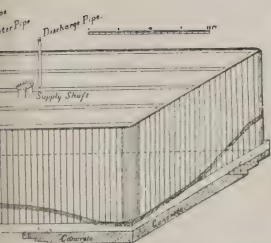
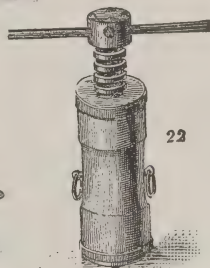
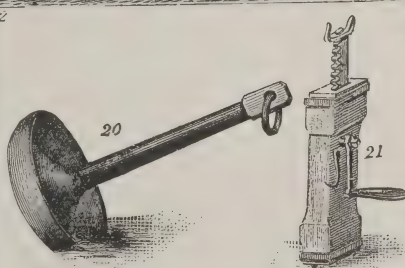
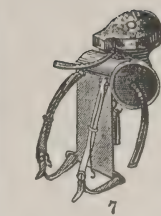
DIVINE COMEDY. See DANTE.

DIVINE RIGHT. A term applied to describe the source of the power claimed for the monarch, by the royalist party, in the great controversies between the monarchical and the parliamentary or commonwealth parties in England in the 17th century. The monarch was held to be the immediate representative of the Deity, to whom alone he was responsible for all his actions—a principle which, of course, relieved him from all human responsibility. The idea was little known in that country until the quiet transfer of the crown from the Tudor to the Stewart dynasty showed that the hereditary principle was firmly established. It was found by some ecclesiastics in the doctrine of the civil law, which, in imitation of the practice of oriental nations, flattered the Roman emperors by attributing to them a power founded on divine institutions. Throughout a long and miserable contention, D. R. was on the one side maintained to be the source of political power, while on the other it was maintained that that power emanated from the will of the people, expressed in what was called "the social contract." The chief writers on the side of D. R. were Salmasius and sir Robert Filmer; on the other, Milton, Algernon Sydney, and Harrington. The controversy revived in the discussions which caused the French revolution, long after the settlement of the crown on William and Mary and the Hanover dynasty had settled it in Britain.





DIVING APPARATUS, DOCKS, ETC.—1. Steam-dredge. 2. Tow-boats. 3. Diving-bell. 4. 5. 6. 7. 8. Shoe; 9. Knife, of diving apparatus. 10. Tidal-dock. 11-19. Perspective and



. Diver with Denarouse's apparatus. 5. Dry-dock (Toulon). 6. Helmet; 7. Knapsack; 9. Dagger; 20. Anchor. 21. Iron screw. 22. Handscrew.

DIVINE SERVICE, a tenure by which the tenant was bound to do some special divine service, as to sing so many masses, to distribute a certain sum in alms, or the like. It differed from frankalmoigne (q.v.) in this, that the lord could distrain for the former, not for the latter, which, being an indefinite service, could be enforced only by a complaint to the ordinary or visitor.

DIVING. The "treasures of the deep" have at all times been the subject of much visionary exaggeration, and the accounts of the exploits of divers equally extravagant. We could name a popular school-book, still in extensive use, where children are seriously informed that the pearl-divers of the east acquire by practice the power of remaining under water from 15 to 20 minutes. Such statements are common enough in narratives of ancient date, in some of which the time is extended to two hours. It need scarcely be said that these accounts are absurd, no such endurance being possible. The more skillful divers may remain under water for two, or even three minutes; some modern accounts say four, and even six, but this is very doubtful. In a swimming and diving contest between some North American Indians and Englishmen in a London swimming-bath, one of the Indians, a renowned swimmer and diver, remained under water just one minute and a half, but a London artisan beat him by a few seconds.

In the *Encyclopædia Britannica*, Prof. Faraday describes an interesting fact to which his attention was directed by a gentleman connected with the Asiatic society, who, according to Prof. Faraday, was the first to make the observation. It was observed that by breathing hard for a short time, as a person does after violent exercise, the breath could then be held much longer than otherwise. Prof. Faraday found that he could only hold breath for three quarters of a minute, if he attempted it without preparation, but that after eight or ten of such forced inspirations, he could hold breath for two minutes. This he explained on the supposition that, ordinarily, a considerable quantity of carbonic acid remains in the involved passage of the lungs, but that it becomes completely expelled by the forced breathing, and its place supplied by atmospheric air. As regards the novelty of the observation, Prof. Faraday was mistaken, as the writer of this can testify, for when a boy, he and his companion bathers in the Serpentine, in Hyde Park, commonly practiced it. The Red Indian and the artisan above referred to also did the same; it is, in fact, a sort of preparation that a practiced diver would make almost instinctively. After a few deep inspirations of this kind, a sense of giddiness is felt, and it is not prudent to carry the experiment far beyond this stage, as a fit of insensibility not unlike apoplexy is apt to result.

This giddiness, which is always produced, and the possible insensibility, indicate a different explanation from that of Faraday. The mere removal of residual carbonic acid from the lungs is not sufficient to explain these; we should rather suggest that all the phenomena result from an excessive oxygenation of the blood, and a consequently accelerated circulation similar to that produced by breathing nitrous oxide. It will be easily understood, that if the blood be forced to take an excess of oxygen, a longer time should elapse before a fresh supply would become necessary—that is, before suffocation would take place; and the giddiness, flushing of the face, and the insensibility, are results to be expected from such an excess.

Most divers suffer severely from the continual efforts in holding the breath; blood-shot eyes and spitting of blood are common among them. This rude mode of diving is now but little used except for pearl and sponge fishing; and even for these purposes, only an uncivilized people, with very little capital and knowledge, would continue to use it, as the modern applications of science afford such immense advantages for all kinds of subaqueous operations, as will be seen by the next article.

DIVING-BELL. From what has been stated in the preceding article **DIVING**, it will be at once understood that for all such purposes as subaqueous works upon the foundations of piers, bridges, etc., or the exploration and raising of sunken vessels, the efforts of the unaided diver would be almost valueless, and accordingly various contrivances for supplying air to the diver have been made. The *cacabus aquaticus*, or aquatic kettle, described by Taisnier as having been used by two Greeks in Spain, at Toledo, in 1538, in the presence of the emperor Charles V. and a multitude of spectators, is one of the earliest reliable accounts of a diving-bell. From his description, this must have been similar in principle and construction to the modern diving-bell, but of clumsy dimensions, and wanting in efficient means of renewing the supply of air. Dr. Halley's diving-bell, about 1720, was a wooden chamber of about 60 ft. internal capacity, open at the bottom, where it was loaded with lead to keep it perpendicular in its descent. Strong pieces of glass were set in the upper part to admit light. Casks filled with air, and loaded with lead, were let down with the bung-hole downwards; and from these a supply of air was drawn by means of a hose. The form of diving-bell now in use was first constructed by Smeaton for the works at Ramsgate harbor, 1788. It was of cast-iron, and weighed 50 cwt.; its height, $4\frac{1}{2}$ ft; length, the same; and width, 3 feet. It sunk by its own weight, and was lighted by stout pieces of bull's-eye glass firmly cemented by brass rings near the top. The principle of the diving-bell will be easily understood by floating a piece of lighted candle or a wax-match on a cork, and then covering it with an inverted tumbler, and pressing downwards; the candle will descend below the level of the surrounding water, and continue burning for a short time, although the tum-

bler be entirely immersed. The reason is obvious enough: the air in the tumbler having no vent, remains in it, and prevents the water from occupying its place, so that the cork and candle, though apparently under water, are still floating, and surrounded by the air in the tumbler; the candle continues burning until the oxygen of the air is exhausted, and then it goes out, as would the life of a man under similar circumstances. If vessels full of air, like the barrels of Dr. Halley, were submerged, and their contents poured into the tumbler, the light might be maintained; but this could be better done if a tube passed through the tumbler, and air were pumped from above through the tube into the tumbler.

The modern diving-bell, which is made of cast-iron like Smeaton's, is supplied with air in this manner. It must be remembered that air is compressible, and diminishes in bulk in proportion to the pressure, so that at a depth of about 33 ft. in water, it would occupy half the space it filled at the surface; if the inverted tumbler were carried to this depth, it would be half filled with water. A considerable quantity of air has, therefore, to be pumped into the diving-bell, merely to keep it full as it descends; the air thus compressed exerts a corresponding pressure, and would rush up with great force if the tube were open and free. This is prevented by a valve opening downwards only. When the diving-bell has reached its full depth, the pumping is continued to supply air for respiration; and the redundant air overflows, or rather *underflows*, by the open mouth, and ascends to the surface in great bubbles. The diving-bell is provided with a platform or seat for the workmen, and suspended from a suitable crane or beams projecting from a barge or pier; men above are stationed to work the pumps, and attend to the signals of the bellman. These signals are simply made by striking the sides of the iron diving-bell with a hammer, and as sound is so freely communicated through water, they are easily heard above. One blow signifies "more air;" two blows, "stand fast;" three, "heave up;" four, "lower down;" five, "to eastward;" six, "to westward," etc. These, of course, may be modified as agreed upon. Messages are also sent up, written on a label attached to a cord. The sensations produced in descending are rather curious. Immediately on the mouth of the diving-bell striking the water, a feeling like a slight blow on the internal ear is produced; a dull ringing in the ears and a sense of deafness follow.

The workmen accustomed to subaqueous existence do not suffer these inconveniences; novices feel pains in the head and ears, but these pass away after a short initiation. It is stated that one man who had suffered from difficulty of breathing was completely cured by "belling," and that deafness is not produced by it, but, on the contrary, is in some cases relieved.

DIVING-DRESS. In Schott's *Technica Curiosa*, published in 1664, is described a *lorica aquatica*, or aquatic armor, which consisted of a leathern dress, to protect the diver from the water, and a helmet. In 1721, Halley describes a contrivance of his own of nearly the same kind; its object was to enable the diver to go out from the bell and walk about; he was to be provided with a waterproof-dress, and a small diving-bell, with glass front, as a helmet over his head, which was to be supplied with air by means of a tube from the diving-bell.

In 1798 Kleingert of Breslau invented a diving-dress available for depths up to 20 feet. The head and body of the diver were encased in cylindrical tin-plate armor, and his legs, in leather breeches. Fresh air was conveyed to him and the vitiated air was removed by means of pipes. In 1829 August Siebe devised an open helmet diving-dress, having a copper helmet and breastplate, with attached canvas jacket, below which the air was allowed to escape, but to avoid the admission of water the diver was forced to keep a vertical position. In 1839 Siebe improved his dress, which now is a waterproof costume with helmet of tinned copper, having circular glasses in front, valves to admit and discharge air, and a signal line to allow communication with those above water. The weight of the dress is about 275 lbs. In 1880 Fleuss invented a dress weighing only 20 lbs. This has a copper cylinder fastened to the back, carrying a supply of compressed oxygen. The carbonic acid exhaled by the diver is absorbed by caustic soda in a receptacle fixed above the copper cylinder, while the nitrogen is breathed over and over again. In this dress the diver may remain several hours below the surface. For lighting, arc and incandescent lights are used, as well as improved oil-lamps supplied with air by force-pumps. Slates and signal lines are used for purposes of communication. According to Siebe the greatest depth to which a man has ever descended is 204 feet; equivalent to a pressure of 88½ lbs. per square inch.

DIVINING-ROD—often called the *virgula divina*, the *baculus divinatorius*, the caduceus or wand of Mercury, the rod of Aaron, etc.—is a forked branch, usually of hazel, and sometimes of iron, and even of brass and copper, by which it has been pretended that minerals and water have been discovered beneath the surface of the earth. The rod, when suspended by the two prongs, sometimes between the balls of the thumbs, will distinctly indicate, by a decided inclination, it is alleged, the spot over which the concealed mine or spring is situated. Other powers are ascribed to the divining-rod, but this is the chief. Many men, even of some pretensions to scientific knowledge, have been believers in the occult power ascribed to this magic wand. Agricola, Spellingius, and Kirchmayer, all believed in its supernatural influence. So did Richelet the author of

the dictionary. The learned Morhoff remained in suspense, while Thouvenot and Pryce, in the latter part of the 18th c., gave ample records of its supposed power. Bayle, in his dictionary, under the word *abaris*, gives some ingenious arguments both for and against the divining-rod. In a work published by Dr. Herbert Mayo in 1847 and 1851, entitled *On the Truth Contained in Popular Superstitions*, he gave some curious illustrations of the art, supposed to be possessed by one in forty of the Cornish miners. At Weilbach, in Nassau, he likewise met with one Edward Seebold, who, he says, possessed the power, but afterwards lost it. Arthur Phippen, in 1853, published a pamphlet containing an account of two professional diviners or dowzers. One of them, named Adams, gave remarkable indications of being able to detect water under-ground. He not only was able to discover the particular spot where water might be found—he could even perceive a whole line of water running under-ground.

Scientific men, who have bestowed any care on the examination of nature, regard this alleged power of the divining-rod as an unconscious delusion, ascribing the whole phenomenon to the effect of a strong impression on the mind acting through the agency of the nerves and muscles. See ANIMAL MAGNETISM.

DIVIRIGI (anc. *Tephrene*), a t. of the province of Sivas, Asia Minor, on the Kurner-Su, a branch of the Euphrates, 28 m. n.w from Arabkir. Pop. supposed to be about 5600.

DIVISIBILITY is that property of quantity, matter, or extension, through which it is either actually or potentially separable into parts. Whether matter is or is not indefinitely divisible, is a question which has occupied the minds of philosophers since very early times. See ATOM. There is no doubt that, abstractly speaking, it is indefinitely divisible. We cannot conceive any body or space so small but that we can subdivide it in imagination, and thus figure to ourselves bodies and spaces still smaller; and practically, we know that the subdivision of matter is carried in nature far beyond appreciation either by our senses or by calculation. The diffusion of odors through the air for long periods from odoriferous bodies without their suffering any sensible change of weight, and the tinging of great quantities of fluid by very minute portions of coloring matter, are cases commonly appealed to in proof of the extreme fineness of certain material particles; while, by experiment, it is shown that there is no practical limit to the divisibility of even the most solid substances. Thus, an ounce-weight of silver, gilt over with eight grains of gold, has been drawn out into a wire 13,000 ft. long, which was all its length covered with the gold; and a tube of glass presented to the blow-pipe has been drawn out till it became as fine as a silk fiber, or $\frac{1}{35000}$ th of an inch thick, still retaining its character as a tube with a distinct interior and exterior surface. In fact, in theory, great and small are mere terms of relation; under the microscope, objects invisible to the eye appear of considerable bulk; and as sir John Herschel, in his celebrated *Introduction to the Study of the Physical Sciences*, has put it, there is no reason why a mote in a sunbeam should not be in itself a world. With regard to the indefinite divisibility of space, it may be demonstrated geometrically; and perhaps, after all, it is the feeling that space is infinitely divisible, which compels our minds most strongly to resist the notion of ultimate atoms with definite forms, as conceived in the corpuscular theory.

DIVISIBILITY, in the theory of numbers, means the capability of any number of being divided by another without remainder. To find the condition of divisibility of one number, N , by another, D . Let $N = b_m r^m + b_{m-1} r^{m-1} + \dots + b_1 r + b_0$. See NOTATION. Then $N = b_m (D + (r-D))^m + b_{m-1} (D + (r-D))^{m-1} + \dots + b_1 (D + (r-D)) + b_0$. Expanding the different terms of the right-hand side of this equation, it will appear that $\frac{N}{D}$ will be a whole number, if $b_0 + b_1 (r-D) + \dots + b_m (r-D)^m$ be divisible by D . Hence, if $r = 10$, or the number be in the denary scale, and $D = 9$, and therefore $(r-D) = 1$, any number will be divisible by 9, if $b_0 + b_1 + b_2 + \dots + b_m$ is so, or if the sum of its digits is divisible by 9.

DIVISION, one of the four principal rules of arithmetic, is that by which we find how often one quantity is contained in another. It is a compendious method of subtraction, by which we can at once take one number from another as often as it is contained in it. There are three numbers concerned in D .: the dividend, or number to be divided; the divisor, or that by which the dividend is to be divided; and the quotient, or the number expressing how often the divisor is contained in the dividend. The symbols of D . are $b) a$ ($\frac{a}{b}$), or $a \div b$, where a is the dividend, and b the divisor.

There are various methods of D ., such as the English, Flemish, Italian, Spanish, German, and Indian methods, which differ merely in the manner of arranging and disposing the numbers. The English method will be found explained in all the ordinary text-books of arithmetic. There are also rules of D . for the D . of integers, fractions, and algebraical quantities. The general rule for the D . of vulgar fractions is to multiply the one by the reciprocal of the other. The D . of decimal fractions is performed in the same way as the D . of integers. And, in algebra, D . is practically performed as in arithmetic, either by making a fraction of the dividend and divisor, and reducing the numerator and denominator by the parts common to both, or else by dividing the former by the latter, after the manner of long division. See LOGARITHMS.

DIVISION, a definite part of an army or of a fleet, consisting in the army of a certain number of brigades with cavalry and artillery and commanded by a major-general. In tactics the uniting of two companies in regimental or battalion drills forms a division. Military geographical divisions and departments are established and their commanders assigned by direction of the President. In time of peace army corps, divisions, or brigades are not formed. A division commander supervises the affairs of the departments composing his division as a general commanding in the field does those of his subordinate commanders. For convenience and to fix responsibility, the United States had till 1891 three military divisions. The division of the Atlantic, including the department of the East, with headquarters on Governor's Island, New York harbor. Division of the Missouri, subdivided into the departments of Missouri, Dakota, Texas, and the Platte, with headquarters at Chicago. Division of the Pacific, including the departments of California, Columbia, and Arizona, with headquarters at San Francisco.

In 1897 the military commands comprised eight departments. A naval division is the subdivision of a fleet or squadron, the commander of which flies a pennant to especially designate his division. A portion of a ship's company set apart for a certain service in action is also called a division. Those who serve at the guns are classed as the first, second, third divisions, the powder divisions serve the battery with ammunition; the navigator's division steer the ship, trim the yards, look after the signals and soundings; the engineer's division attend to everything in the engine department; the medical and paymaster's divisions have charge of what pertains to those two departments.

DIVISION OF LABOR, or **DIVISION OF EMPLOYMENT**, a term often used by political economists to express a means by which labor is economized, or, as another method of stating the same result, by which production is increased. The problem in division of labor is so to adjust matters in any given community that each member of it shall work, or be able if he pleases to work, with the greatest possible results. In practice it is, like most other arrangements, apt to be too broad or too narrow. The old term, "jack of all trades and master of none," expresses the truth, that people who try too many things are not likely to be adepts in any. On the other hand, few people can do any sort of work to great perfection, unless it is part, as it were, of a group of functions for which they are more or less prepared. A good dentist will be in some measure a surgeon; a conveyancer or a special pleader will know something of the other departments of legal practice; a shipwright will be able, on occasion, to do other kinds of carpentry, and he will be the better of a general knowledge of the mechanical powers. That division of labor, in fact, which is really productive, is where a man who can do several things selects one as that which he can do best, or has most opportunity of doing. By constant practice at that one thing, and the withdrawal of his attention from other matters, he achieves perfection and rapidity of execution. There is an important difference between this selection of a special pursuit, and the inability to do anything more than one thing, which is often confounded with it. In the former case, the worker, whether with head or hand, has great resources, for his adopted pursuit is the best out of several others, on which he can fall back. The man who can do only one thing is in a precarious condition, because that one thing may be superseded. Indeed, as the one thing which can be so done is generally a very simple thing, it is almost a law in political economy that it will come to be superseded by machinery. Such was the fate of the hand-loom weavers, whose function, especially in the plainer and lighter fabrics, was too easy to last. Of the division of unskilled and easy labor, there is an excellent illustration in Adam Smith's description of pin-making: "One man draws out the wire, another straightens it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head; to make the head requires two or three distinct operations; to put it on is a peculiar business; to whiten the pin is another; it is even a trade by itself to put them into a paper; and the important business of making a pin is in this manner divided into above eighteen distinct operations, which in some manufactories are all performed by distinct hands." This division was doubtless useful, so long as pins were made entirely by human hands. It prompted serious inquiries, however, how far such functions were of an improving or a deteriorating character, and essays were written to prove that in manufacturing countries human beings were deteriorating, as no one of them had the faculty of self-support in separation from his fellows, and none could even make one single article by himself, all being dependent for their bread on a complex co-operation, which might break down any day. The answer to such fears may be found in the pin-making of the present day, where one man tends a machine, feeding it with wire at one end, while the pins drop out at the other. This, too, is the fruit of division of labor, for many skillful heads and hands have been occupied in bringing to perfection the different parts of the machinery. It is of the highest importance to the working-classes of a country, to keep in view that though the division of labor does sometimes create functions which, while they are extremely simple and easy, are of value as helping other functions to go on, yet this kind of easy and uniform work has no stability in it, and the possession of the facility for doing it acquired by practice is no permanent industrial endowment, since it is pretty sure to be superseded by machinery.

DIVISOR. See **DIVISION**. See also **NUMBERS**, **THEORY OF**.

DIVORCE is the dissolution of marriage by the act of the law on due cause shown. The desire to obtain a release from the matrimonial bond has existed at all times and under all legal systems. In heathen nations this release was often granted on the slightest grounds. Even among the Romans, marriage was regarded as little more than a conventional union, to be observed so long only as it suited the mutual convenience of the spouses. Christian nations, on the other hand, adopting as the basis of their systems the scriptural law as declared in Matt. xix. 9, Mark x. 9-11, Luke xvi. 18, and 1st Cor. vii. 10, 11, are agreed in considering marriage a sacred tie, not to be dissolved except on the ground of unfaithfulness to the marriage vow. Even this limited ground for dissolution of marriage is denied by a large portion of the Christian world. By the civil law, as it existed for some centuries after Christianity, a greater laxity was allowed in regard to divorce. The emperor Constantine was the first to prohibit dissolution of marriage by simple consent of the parties. This practice was again revived under the emperors Theodosius and Valentinian; and though those emperors subsequently rescinded this edict, yet the rule as to the grounds on which marriage might be dissolved continued to fluctuate. The law as substantially adopted by Justinian assigned the following justifiable causes for divorce on the part of the wife: certain high crimes, including murder, treason, poisoning, attempts upon the life of the wife, intimacy with prostitutes, and adultery; on the part of the husband the same, with the addition of passing the night out of his house, and visiting places of amusement without his consent. By the canon law, marriage was regarded as a sacrament; and though marriage contracted in disobedience to certain rules might be declared null *ab initio*, a marriage validly contracted would not be dissolved except by papal dispensation. But the rule of the canon law was not uniformly adopted by the states of Europe, and it was not till the famous council of Trent issued a decree in its 24th session, in 1562, declaring marriage indissoluble even after the adultery of one or both of the parties, that a uniform rule on the subject was established. But before this decree was issued, the reformation had made progress throughout Europe, and thus a change again took place in regard to the law of divorce. It should be observed that, though by the canon law divorce *a vinculo matrimonii* was unattainable, parties might obtain a separation *a mensâ et thoro*. Roman Catholic countries adopted the principle laid down by the council of Trent, and this rule continues to be in force in most countries which are in the Roman Catholic communion. In Protestant countries, on the other hand, it may be generally stated that the liberality with which divorces have been granted has steadily increased. Luther and Calvin admitted divorce for adultery and malicious desertion. The former crime they thought worthy of the death penalty, but they did not think it wise to prohibit the marriage of the divorced adulterer, since the civil law did not take this view of the offense. The laws of Prussia on the subject of divorce are perhaps more liberal than those of any other nation of the reformed faith. Divorce is there permitted for adultery, sodomy and other unnatural vices, malicious desertion, persistent refusal of marital intercourse, plots or practices endangering life or health, ungovernable temper, drunkenness, extravagance, etc., unless convicted after the admonition of the judge; failure of the husband to support the wife, hopeless insanity continuing for more than a year, and, where there are no children, deliberate mutual consent. In Holland and in Scotland divorce may be obtained on the ground of ill-usage, and perhaps desertion (q.v.). Condonation and collusion, but not recrimination, are, in Scotland, a bar to obtaining a dissolution of marriage on the ground of adultery. In France the canon law prevailed until the French revolution brought about a change in the rules relating to marriage, and a short period followed in which freedom of divorce was established. By the civil code (1803) both absolute divorce and judicial separation were granted. The former could be obtained on the ground of adultery, but when the wife was petitioner it must be shown that the husband had kept his concubine in the conjugal residence. Divorce was granted to either party for any outrage, gross cruelty, or grievous injury inflicted upon him or her by the other, or for condemnation of the other to infamous punishment. Mutual consent, subject to careful restrictions as to age, consent of the relatives, duration of marriage, protection of children, etc., was also sufficient ground for divorce. Neither party could marry within three years after the divorce was granted. In 1816, as a consequence of the religious reaction, the sacramental theory as to the nature of marriage regained the ascendancy, and the laws relating to divorce were repealed, but judicial separation was retained in the new system. Efforts were made in 1831 and 1832 to renew the previous divorce laws, but failed. In 1881, M. Naquet made an unsuccessful attempt in the chamber of deputies to procure the repeal of the law of 1816; the majority stood firm against the legalization of divorce. But in the session of 1883 the Naquet bill was finally passed, the law of 1816 was repealed by a large majority, and divorce was granted for causes of adultery, conviction of crime, cruelty, and on other grounds. In England, previous to the passing of the act of 1857, establishing the divorce and matrimonial court-marriage was, by the common law, indissoluble. It was, indeed, competent to obtain a declaration of nullity of marriage on the ground of relationship, previous marriage of one of the parties, mental or physical incapacity, coercion, or fraudulent representations as to the essentials of the relation, as, for example, false impersonation. But the judgment so obtained was not a decree of divorce, but a declaration that the marriage tie between the parties had never really been contracted. Dissolution of marriage even on these

grounds is subject to many limitations, as in the case of alleged fraud or coercion, voluntary cohabitation of husband and wife is a bar to divorce; and where parties have married under the age of consent, if such cohabitation continues after they have reached their majority, divorce cannot be obtained on the ground of their minority. A wife may now obtain a divorce on the ground of the husband's incestuous adultery; or of his bigamy with adultery; or of rape; or of sodomy; or of adultery coupled with gross cruelty; or of adultery coupled with desertion without reasonable excuse for two years. The husband may obtain a divorce on the ground of the wife's adultery. But neither party can obtain a divorce on the ground of desertion alone, however long continued. Nor will a divorce be granted should it appear that husband or wife has been guilty of recrimination by committing the same offense, or that there is collusion between them in order to procure the divorce. Parties also who have condoned the offense—that is, who after it has been discovered have consented again to live together as husband and wife—will not be allowed to obtain a divorce. In order to guard against fraud by parties conniving to procure a divorce, power is given to the queen's proctor, by 23 and 24 Vict., c. 144, to interpose, in case he have reasonable ground to suspect collusion or recrimination, in order to oppose a petition for divorce. The court may order the husband to pay a divorced wife a certain sum for her maintenance during their joint lives. After decree of divorce, the offending party may marry again, even with the paramour. But it is enacted, 20 and 21 Vict., c. 85, that no clergyman shall be compelled to solemnize the marriage of any person who has been divorced. He must, however, allow another clergyman, if willing to do so, to perform the marriage. By the acts of 1857 and succeeding years, parties are also entitled to obtain a judicial separation on the ground of adultery, cruelty, or desertion. Judicial separation is declared to be in place of a separation *a mensâ et thoro*. A married woman, having obtained decree of judicial separation, is declared to be in all respects as a *femme sole* in regard to any property that she has or may acquire. Even before obtaining a separation, a woman deserted by her husband may obtain from the court a protection for any property she may acquire by her own industry. When the divorce is on the ground of adultery, both parties may be examined as witnesses. In the United States, during the colonial period, the legislative bodies in the several states gradually assumed the right of granting divorce, and after the revolution the system of divorce by legislative enactment became uniformly established. Experience of this system proving its defective character, the jurisdiction over divorce cases was generally transferred to the courts of equity, and in many of the state constitutions it was distinctly provided that divorce by legislative act should not be permitted. There is no national control over divorce legislation in this country, and, as the states are left to make their own laws regulating the dissolution of marriage, the greatest diversity in their treatment of the subject has arisen and offers a very serious objection to our system, since it is comparatively easy for a party to move from one state to another and procure a divorce on grounds invalid in the state from which he came, and often without the knowledge of other parties intimately concerned. This want of uniformity makes it impossible to lay down general principles as to the grounds on which divorce is granted in the United States as a whole, and a brief outline of the laws relating to the subject in the different states is all that will be attempted in the present article. There are laws granting divorce on certain specified grounds in all the commonwealths except New Mexico and South Carolina. In the latter state divorce is not granted on any grounds whatever, either by courts of justice or by legislative acts, and the results of this state of things offer an interesting subject for investigation to those who maintain the strict canonical view with regard to the indissoluble nature of marriage. It has been remarked that the prevalence and partial legal recognition of concubinage are the effects of this attitude toward the divorce question in South Carolina. (Bishop's *Marriage and Divorce*.) In all the states infidelity and violation of the marriage vow are recognized as valid grounds for divorce. In New York, adultery alone warrants absolute divorce in the eye of the law. Impotence or physical inability in almost all either justifies divorce or renders the marriage voidable. Willful desertion is generally considered a sufficient cause, but the period of absence necessary to substantiate the complaint varies in the different states from one to three years; and in Rhode Island and Virginia, five years must have expired. Other grounds are the following: Habitual drunkenness in all states and territories except Maryland, New Jersey, North Carolina, Pennsylvania, Texas, Vermont, Virginia, and West Virginia. Imprisonment for or conviction of felony, cruel and abusive or inhuman treatment, intolerable, extreme, or repeated cruelty, in most of the states. Failure of the husband to provide for the wife, in California, Colorado, North Dakota, South Dakota, Nevada, Wyoming, Indiana, Idaho, Arizona, Massachusetts, Michigan, Maine, Nebraska, Rhode Island, Vermont, Wisconsin; willful neglect for three years, in Delaware. Fraud and fraudulent contract, in Arizona, Connecticut, Georgia, Idaho, Kansas, Kentucky, Ohio, Pennsylvania, and Washington. Absence without being heard from for three years, in New Hampshire; for seven years, in Connecticut and Vermont; separation for five years, in Kentucky; voluntary separation for five years, in Wisconsin. Reasonable presumption of death by the court, in Rhode Island. Ungovernable temper, in Kentucky; habitual indulgence in violent and ungovernable temper, in Florida; cruel treatment, outrages, or excesses, such as render living together intolerable, in Arkansas, Kentucky, Louisiana, Missouri,

Tennessee, and Texas; such indignities as to render life burdensome, in Missouri, Oregon, Pennsylvania, Tennessee, Washington, and Wyoming; notorious immorality of the husband before marriage, unknown to the wife, in West Virginia; fugitive from justice, in Virginia; gross misbehavior or wickedness, in Rhode Island; gross neglect of duty, in Kansas and Ohio; attempt on life, in Illinois; refusal of the wife to move into the state, in Tennessee; mental incapacity at the time of marriage, in Georgia; three years with any religious sect that believes the marriage relation unlawful, in Massachusetts; joining such a sect and refusing to cohabit for six months, in New Hampshire; inability to live in peace and union, in Utah; settled aversion tending to destroy all peace and happiness, in Kentucky. Absolute divorce is granted on these grounds; but condonation, or collusion, or connivance, with the purpose of procuring a divorce is in all states regarded as a bar to the dissolution of marriage. In Georgia, divorce is only granted after the same verdict has been reached by two juries at different terms of the court. In Connecticut, Illinois, Kentucky, and Missouri, the divorced parties may remarry without restriction. In Massachusetts, either party may remarry, but the defendant must wait two years and get the permission of the court. In Virginia a decree of the court may restrain the guilty party from marrying again; and in Maine the parties cannot marry till after two years without the court's permission. In New York, the plaintiff may remarry, but the defendant is not permitted to do so in the former's life-time except by the express permission of the court, or if, after five years have passed, the plaintiff has remarried, and the defendant's conduct has been uniformly good during the interval. Violation of this rule is punished as bigamy, even when the other party has remarried. In Delaware, Pennsylvania, and Tennessee, the party divorced for infidelity to the marriage vow cannot marry the partner in guilt during the life-time of the former spouse; nor in Louisiana, at any time, such marriage in the latter state being considered bigamy. In all the states, notably in New York, a jealous watch is maintained by the courts over their jurisdiction, and as a rule they refuse to acknowledge the validity of divorces granted to citizens of the state over which their jurisdiction lies by the courts of other states, unless such citizens have actually come under the jurisdiction of those courts. In Kansas, a divorce is granted to an applicant on the ground that the other party has secured a divorce in another state by whose law the defendant is forbidden to marry. If, for example, a wife secures a divorce by the law of New York, which would prohibit the husband from remarrying, the latter, by acquiring a residence in Kansas, may secure a divorce, and if the wife can be served with the papers in the case under the Kansas law, the validity of the divorce cannot be questioned in New York, and the defendant may legally remarry in that state. This affords an illustration of the way in which the legislation of one state may defeat the ends of justice as regarded in another, under the present inconsistent system of divorce in this country. The New York law sometimes permits a sort of polygamy or polyandry. Desertion for five years by either party without being heard from gives the deserted party the right to remarry. If the former return and a petition be duly filed in court, the second marriage is declared void, but only from the date of the decree of the courts. If, however, no such petition be entered and the parties concerned are satisfied, the husband may live in lawful wedlock with two or more wives, or one wife with two or more husbands. The children of both will inherit, and both wives are entitled to dower. From the conflict of laws in various countries on the subject of divorce, questions have frequently arisen as to the competency of a sentence of divorce by a tribunal having power according to the *lex loci* to pronounce such sentence, to annul a marriage contracted in a country where such divorce is not allowed. It appears now to be the generally received opinion, that wherever parties are domiciled they will be allowed to avail themselves of the law of this domicile. But the courts will not recognize a transient visit to a foreign country as sufficient ground to sustain a divorce.

DIX, DOROTHEA LYNDE, b. Mass., 1794. She established a school for girls in Boston, and took much interest in the unfortunate and criminal classes. In 1834, she went to Europe to study methods of the treatment of paupers, criminals, and insane persons. After a great deal of exertion she induced congress to pass a bill granting ten millions of acres of land to endow hospitals for the indigent and insane, but the measure was vetoed by Pres. Pierce. During the civil war she was superintendent of hospital nurses for the union army. Among her publications are *Garland of Flora*; *Private Hours*; *Conversations about Common Things*; *Prisons and Prison Discipline*. She d. 1887.

DIX, JOHN ADAMS, LL.D., 1798-1879; b. N. H.; a politician and soldier. In the war of 1812, he served as an ensign on the Canada frontier. In 1828, he began the practice of law in Cooperstown, N. Y., and became one of the leaders of the democratic party. In 1830, he was adjutant-gen. of the state, and in 1833, secretary of state and superintendent of common schools. He was chosen member of the assembly in 1842, and in 1845, appointed to fill a vacancy in the U. S. senate. In 1848, when the democratic party divided on the question of the extension of slavery, he went with the "free soil" wing and was their candidate for governor, but was not elected. In 1853, he was assistant treasurer of the United States in the city of New York. In 1860, he was chosen secretary of the treasury. Secession was just beginning, and New Orleans was substantially in the hands of the confederates. Two revenue cutters there were ordered

to New York by the secretary. The captain of one of them refusing to obey, secretary Dix immediately telegraphed to have him arrested and treated as a mutineer if he offered any resistance, closing the dispatch with the words: "If any man attempts to haul down the American flag, shoot him on the spot." In 1861, Dix was appointed maj.gen. of militia, and the same year maj.gen. of U. S. volunteers. In 1862, he was placed in command of the department of Maryland, and about the same time was sent to Fortress Monroe in command of the seventh army corps. He was in command in New York city at the time of the riots, July, 1863, and in 1864-65, commanded the department of the east. In the autumn of 1866, he was minister to France, and resigned, 1868. In 1872, the republican party elected him governor of New York. He retired in 1875, and passed the remainder of his life in private. Besides miscellaneous papers he was the author of *Resources of the City of New York*; *Decisions of the Superintendents of Common Schools of New York*, and *Laws relating to Common Schools*; *A Winter in Madeira*; *A Summer in Spain and France*; and two volumes of speeches.

DIX, MORGAN, S.T.D., b. New York, 1827; son of John A.; a clergyman of the Protestant Episcopal church, graduate of Columbia college and of the Protestant Episcopal general theological seminary. He was ordained in 1853, and in 1855, became assistant minister of Trinity church, New York. In 1859, he was assistant rector of the parish, and in Nov., 1862, after the death of Dr. Berrien, he succeeded as rector, where he still remains. He has published, among other works, *A Commentary on the Epistle to the Romans*; *An Exposition of the Epistles to the Galatians and Colossians*; *Lectures on the Pantheistic idea of an Impersonal Substance Deity*; *Essays on Christian Art*; *Lectures on the Two Estates*; *Lectures on the Prayer Book of Edward VI.*; *Memoirs of John A. Dix*; *Gospel and Philosophy*; *The Sacramental System*; *Harriet Starr Cannon* (1897), etc.

DIXEY, HENRY E., actor, was born in Boston, Jan. 6, 1859. At the age of nine years he became a member of the Howard Athenæum company, Boston, taking the part of "Peanuts," in the play *Under the Gaslight*. He afterward appeared in *Evangeline*. Other rôles in which he has appeared, are: "Dr. Syntax," in *Cinderella at School*; "Lorenzo," in *The Mascot*; "Sir Mincing Lane," in *Billee's Taylor*; "Bunthorne," in *Patience*; and "Sir Joseph Porter," in *Pinafore*. In 1883 he was engaged at the Bijou Theatre in New York, where he played in *Adonis*. In one or another of his parts, he has played in all the large cities of the United States. In 1889 he produced *The Seven Ages* at the Standard Theatre, New York, and in 1891, *The Solicitor*. In 1894 he became a member of Mr. Daly's company.

DIXIE, a popular name for the southern states of the American union, much in use about the time of the secession movement. It seems to have been adopted from a song of the slaves which set forth the delights of a region where they were under a good master—the region being called Dixie's Land, from a well-known kindly slave-holder of that name. The old song, or one based upon it, became widely favored as a sectional rival of *Yankee Doodle*.

DIXIE, Lady FLORENCE CAROLINE DOUGLAS, b. Scotland, 1859; dau. of the 7th marquis of Queensberry; married, 1875, Sir Alexander Beaumont Churchill Dixie, Bart. Her home is Bosworth Park, near Hinckley, in Leicestershire. Lady D. is an energetic traveler and vigorous writer; visited Patagonia with her husband and two brothers, and published *Across Patagonia*, 1880; traveled in South Africa, 1881, and published *Defence of Zululand*, 1882, and *In the Land of Misfortune*, 1882. Her later works include *Gloriana*, 1893; *The New Woman*, 1896, etc.

DIX ISLAND, off the Maine coast, about 10 m. s.e. of Rockland; a remarkable deposit of excellent granite, from which the New York post-office, the treasury building at Washington, and many other fine public buildings have been constructed. There are probably 1500 men and one or two hundred women and children on the island.

DIXON, a co. in n.e. Nebraska, bordering on the Missouri river; 468 sq. m.; pop. '90, 8084. Agriculture is the chief business. Co. seat, Ponca.

DIXON, a city and co. seat of Lee co., Ill., on Rock river and the Chicago and Northwestern and the Illinois Central railroads; 98 m. w. of Chicago. It contains the Northern Illinois normal school, Steinman institute, public hospital, public library, business college, national banks, electric lights, artesian well water, and manufactories of condensed milk, shoes, plows, etc. Pop. '90, 5161.

DIXON, EDWARD H., M.D., 1808-80; son of Jonathan; b. and d. New York. He studied at Rutgers medical college, and under Dr. Valentine Mott; was supt. of the house of refuge and of the asylum for deaf and dumb. He wrote *From Cradle to Grave* and several other medical works; and was widely known through his incisive editing of *The Scalpel*, 1849-61, a popular medical magazine.

DIXON, JOSEPH, 1799-1869; b. N. J. He invented friction-matches, and made important improvements in photography, lithography, bank-note printing, steel-smelting, lens-grinding, etc., and built for his own amusement the largest orchestration in the country, with cylinders 10 ft. in length. He was by turns a shoemaker, printer, lithographer, wood-engraver, and physician.

DIXON, WILLIAM HEPWORTH, an English author, was born in the West Riding of Yorkshire in 1821, and settled in London in 1846, where he soon acquired a considerable reputation by his writings. A series of papers published in the *Daily News*, "On the Literature of the Lower Orders," and another on "London Prisons," attracted

considerable attention. The latter reappeared in a volume published in 1850. Before this, but in the same year, he published *John Howard, and the Prison World of Europe*. It was with difficulty he could induce the publisher to accept it, yet when published, it went through three editions in one year. D. now devoted himself principally to historical biography. In 1851, appeared the first edition of his *William Penn*, a work called into existence by the onslaught made by Macaulay on the eminent Quaker, in which D. undertook to disprove Macaulay's charges. In 1853 was published his *Life of Blake*; and in the same year an anonymous pamphlet, entitled *The French in England*, designed to allay the fear of a French invasion then prevalent. In 1853, D. was appointed editor of the *Athenæum*—a chair he vacated in 1869. In 1860, he published his *Life of Lord Bacon*, and in 1863, *The Holy Land*. He gave the public *New America* in 1867; *Spiritual Wives* in 1868; *Free Russia* in 1870; *The Switzers* in 1872; *History of Two Queens* in 1873-74; *White Conquest* ('75); *British Cyprus* ('79). He d. '79.

DIXON'S EN TRANCE, a strait of 100 m. in length from e. to w. on the n.w. coast of America, divides Queen Charlotte island on the s. from the Prince of Wales archipelago on the north. It is, therefore, of some political importance, as separating the British possessions in this quarter from those of the United States. Lat. 54° 30' n., and long. 132° west.

DIXWELL, JOHN, 1608-89; of a good family in Kent; one of the judges of Charles I. After the accession of Charles II. he was condemned to death, but fled to America, and lived undiscovered in New Haven, under the assumed name of John Davids.

DIZFUL, a t. of Persia, on the river Dizful, in lat. 32° 10' n., and long. 48° 34' east. It is the capital and principal mart of its province (Khuzistan). A handsome bridge of twenty arches crosses the river here. The foundation is of stone and of ancient date, the upper portions are of brick and are modern. Pop. estimated at 16,000.

DIZIER, ST., a t. of France, in the department of Haute-Marne, 10 m. n. of Vassy, is situated on the Marne, which here begins to be navigable. It is a very long and narrow, but well-built town, the streets being wide, clean, and regular. In 1544, D. resisted for a month the assaults of a Spanish army under Ferdinand de Gonzaga; a resistance of the greatest consequence to the French ruler, Francis I., the delay enabling him to collect his forces to oppose the march of the Spaniards upon Paris. In 1814, the French twice defeated here the invading army of the allies. The chief industrial features of the place are iron forges and foundries, boat-building yards, in which a great number of river and canal boats are constructed, and cotton factories. There is also a considerable trade in wood, iron, and grain. Pop. '91, 13,372.

DJEZZAR, i.e., *Butcher*, the name given, on account of his cruelty, to Achmed Pasha, famous for his obstinate defense of Acre against Napoleon I. He was born in Bosnia about 1735, and rose, through murder and treason, from the condition of a slave to the pashalic of Acre. In the beginning of 1799, the French entered Syria from Egypt, and advanced from victory to victory till they reached Acre, which was laid siege to on the 20th Mar. By the advice of col. Philippeaux, a French émigré, and of sir Sydney Smith, the commander of the British fleet in the Levant, D. was induced to hold out; and such was the savage doggedness of his resolution, that Bonaparte was obliged to retire on the 21st of May. It is said that during the siege he sat on the floor of his palace, surrounded by a heap of gory skulls, distributing money to all who brought in the heads of Frenchmen. He died at Acre in 1804. D. was at times maniacal in his cruelties. He whipped off the heads of his wives without the slightest ceremony—seven at a time! But he had also moments of remorseful tenderness, in which he helped the poor and provided for those he had injured. He is said to have possessed the sharpest discernment, and was a very vigorous ruler.

DMITROV, an ancient t. of Russia, on the Jakhrama, an affluent to the Volga, 40 m. n. of Moscow. It covers a large area, a considerable part of which is occupied by gardens, but as a whole is poorly built. It contains a college and seven churches, and has manufactures of silk and cotton goods, tanneries, etc. Pop. 9206.

DNIE PER, one of the large rivers of Europe; has its source in certain swampy forest-lands in the n. of the Russian government of Smolensk. Its general direction, until it reaches Kiev, is south. From Kiev, its course is s.e. to Ekaterinoslav, where it turns directly s. past Alexandrovsk, below which town it sweeps round to the s.w., and pursues that direction until it debouches in the Black sea, between the governments of Kherson and Taurida, its embouchure forming a gulf of about 50 m. in length, with a breadth of from 1 to 6 miles. Its principal affluents are the Desna and Soj from the e., and the Pripet, the Beresina, and the Druz from the west. The total length of the D. is upwards of 1000 m., and it is navigable almost from its source, its breadth at Dorogobush, about 50 m. below its source, being 210 feet. Some of the finest governments of the Russian empire lie within its basin, with all of which its navigable branches and canals enable it to hold communication. In its upper part, it flows through a marshy forest territory; its middle and lower course is rocky. Below Ekaterinoslav, indeed, there are no less than 13 rapids in the course of about 40 m.; but these impediments to navigation have been overcome in part by blasting, and by splendid hydraulic-works erected by the Russian government. The produce of the provinces, consisting for the most part of corn, timber, iron, salt,

hemp, and linen, are usually conveyed down the river to ports on the Black sea, but many vessels pass annually from the D. to the Baltic by the Beresina and the Dwina. At Smolensk, the waters of the D. are frozen from Nov. to April; at Kiev, they are ice-bound only from Jan. to Mar. Sturgeon, carp, and pike abound in the river. As the *Borysthènes* the river was known in the 7th c. B.C. to the Greeks, who regarded it as the most valuable river on earth next to the Nile.

DNIE'STER, a river of Europe, flowing chiefly through Russia, but having its rise in the Carpathian mountains, in the Austrian crown-land of Galicia, about lat. 49° 10' n., long. 23° east. Its general course, until it reaches the Russian territory, is s.e.; it then runs e. for a short distance, and thence s.s.e., forming the boundary between Besserabia and Kherson, past Mohilev, Dubossari, and Bender, to the Black sea, which it enters by a shallow shore lake, 19 m. in length and 5 in breadth, between Akerman and Ovidiopol. The total length of the D. is between 500 and 600 m., its current throughout being very rapid. Until it reaches the Russian frontier, its right bank is skirted by offsets from the Carpathians; but at that point, the country, which above has been level on only one side, opens into a broad flat plain, through which the river, broken at intervals by masses of rock, rushes muddy and turbid. The downward navigation is interrupted by a series of falls and whirlpools. Wood and grain are the chief products conveyed down the river.

DOAB, a word of Sanscrit origin, signifying primarily "two rivers," but applied, like the Gr. *mesopotamia*, and the Lat. *interamnia*, to the country between two rivers. The two roots of the word are common to all the Aryan languages: the first appears in Lat. *duo*, Eng. *two*; the second in Celt. *avon*, a river, and in *Danube* or *Donau*. Punjab ("five rivers") is a term of the same kind; but while Punjab exists merely as a proper name of one particular region, Döab is used as the common appellation of any region in general that fulfills the conditions. When introduced, however, without local reference of any kind, the Döab means the space inclosed by the Jumna on the s.w. and the Ganges on the n.e.—a space extending from Allahabad to the base of the Himalayas, a distance of upwards of 500, with an average breadth of 55 miles. The fertility of this region has been much increased by the Ganges canal (q.v.).

DOANE, GEORGE WASHINGTON, D.D., LL.D., 1799-1859; born N. J.; graduate of Union college in 1818; ordained 1821; and rector for three years in Trinity (Prot. Ep.) church, New York. He was assistant minister and rector of Trinity church, Boston, 1828-32, and was then chosen bishop of New Jersey. While in this office he made special efforts for higher Christian education, and opened St. Mary's Hall at Burlington, on the Delaware river, a boarding-school for girls. In 1846, he founded Burlington college. His denomination flourished greatly under his episcopate. He published a volume of poems and a volume of sermons.

DOANE, WILLIAM CROSWELL, D.D., LL.D., b. Boston, Mass. 1832; was graduated from Burlington coll., Burlington, N.J., 1850; ordained priest in the Prot. Epis. church, 1856. During his diaconate he was curate to his father, the late Bp. George W. Doane; was rector of St. Barnabas' church and St. Mary's church, Burlington; St. John's church, Hartford, Conn.; and St. Peter's church, Albany, N. Y. He was consecrated bp. of the Prot. Epis. diocese of Albany, 1869. His chief works are: *A Volume of Questions on the Collects, Epistles, and Gospels*; and *The Life and Writings of The Rt. Rev. Geo. Washington Doane, S.T.D., LL.D.*, 4 vols.

DOBCHICK. See GREBE.

DOBELL, SYDNEY, a modern English poet, was b. in London in 1824. His father, who was a wine-merchant, removed to Cheltenham in 1835. Here D., whose education was entirely private, lived till 1850, when the *Roman* was published, and received with favor by the literary world. After the publication of this poem, D. resided for some time in Switzerland. Shortly after his return, the delicate state of his wife's health brought him to Edinburgh, where he remained till 1857. He afterwards resided on the Cotswold hills, near Gloucester. Besides the *Roman*, D. published *Bulder* (1854), *Sonnets on the War*, in conjunction with Mr. A. Smith (1855), and *England in time of War* (1856). His poems exhibit a singular mixture of the philosophical and the poetical spirit. Many of his passages are as spiritual in conception and lavish in imagery as the finest portions of Shelley; others, again, are as obscure, intricate, and involved as the rhymed enigmas of Cowley or Donne. In 1865, D. published a political pamphlet advocating a graduated suffrage and plurality of votes; and in 1871, *England's Day*, a lyric. He died in 1874. A collected edition of his poems was published in 1875; and in 1876, *Thoughts on Art, Philosophy, and Religion*. See *Life and Letters of Sydney Dobell* (1878).

DOBROWSKI, JOSEPH, the founder of Slavic philology, was b. Aug. 17, 1753, at Gyermet, near Raab, in Hungary, where his father, a Bohemian by birth, was stationed in garrison. He studied at the gymnasium of Deutschbrot, and subsequently at Klattau and Prague. In 1772, he entered the order of the Jesuits at Brünn, but on its dissolution ten months after, he returned to Prague, to continue his theological studies, and in 1776, became tutor in the family of the count von Nostitz. During the years 1780-87, he edited a critical journal of Bohemian and Moravian literature. This soon involved him in various strifes, and ultimately the review was "stopped" by the

authorities, but not before it had added largely to D.'s reputation. In 1792, at the expense of the royal Bohemian scientific society, he made a journey to Denmark, Sweden, and Russia, to search after the fate of those Bohemian books and MSS. which the Swedes had carried off from Prague during the thirty years' war. Two years after, he traveled through Germany, Italy, and Switzerland. On his return, he manifested symptoms of a disordered mind, and in 1801, had to be confined for some time. He speedily recovered, but was subject to intermittent fits of insanity until his death, which happened Jan. 6, 1829. D. is reckoned one of the highest, if not the very highest, authority on all matters connected with Bohemian history and literature. His principal productions are—*Scriptores rerum Bohemicarum* (Prag., 2 vols., 1783-1784); *Geschichte der Böhm. Sprache und ältern Literatur* (Prag. 1792); *Die Bildsamkeit der Slaw. Sprache* (Prag. 1799); *Deutsch-Böhm. Wörterbuch* (2 vols., Prag. 1802-21), in which he was largely assisted by other eminent Bohemian scholars; *Lehrgebäude der Böhm.-Sprache* (Prag. 1809); and *Institutiones Linguae Slavonicae Dialecti Veteris* (Vienna, 1822).

DOBRUDSCHA, or DOBRUDJA (anciently *Scythia Minor*), a region formerly Turkish, now belonging to Roumania, lies between the lower Danube and the Black sea; the Berlin congress of 1878, in transferring it to the principality, fixed the southern limit, formerly somewhat indefinite, at a line from Silistria on the Danube to Mangalia on the sea-coast. The n.e. of this region is occupied by marshes and the delta of the Danube; the rest of the area is partly steppe and partly cultivated corn-land. The inhabitants comprise a few Bulgarians and Roumanians, Tartars, Circassians, Osmanli Turks, Greeks, Armenians, and Jews. Salt is manufactured, and fishing carried on.

DOBSON, HENRY AUSTIN, English poet, was born at Plymouth Jan. 18, 1840, and was educated at Beaumaris, Coventry and Strasburg. He intended to adopt the profession of his father, civil engineering, but in 1856 entered the Board of Trade as a clerk. In 1868 he published some poems in Trollope's *St. Paul's Magazine* and soon attracted attention by his skillful and graceful handling of French artificial forms of verse—the rondeau, ballade and others—and by his delicate satire. Among his volumes of poetry are: *Vignettes in Rhyme and Vers de Société* (1873); *Proverbs in Porcelain* (1877); selections from these entitled *Old World Lyrics* (1883); *At the Sign of the Lyre* (1885). His prose includes *Lives of Hogarth* (1879), *Fielding* (1883), and *Steele* (1886); *Thomas Bewick and his Pupils* (1884); *Memoir of Horace Walpole* (1890); *Four French Women* (1873) and he has edited *Eighteenth-Century Essays* (1882); *Gay's Fables* (1882); *Goldsmith's Vicar of Wakefield* (1883); *Beaumarchais' Le Barbier de Séville* (1884); *Selections from Steele* (1885); *Proverbs in Porcelain* (1893); *The Story of Rosina* (1895); *Eighteenth Century Vignettes* (3d series, 1896), etc.

DOCTÆ (from the Gr. *dokēō*, to appear or seem) was the name given in the early church to those heretics who held that the human nature of Jesus Christ was a semblance and not a reality. The philosophers of polytheism, as well as of Judaism, had explained the appearances of divinities and of angels by holding that the assumption of bodies was only momentary, or in appearance. And when the Gnostic Christians found it impossible to conceive the essential union of the divine nature with a body composed of matter, which they held to be the seat of all evil, they had recourse to the same expedient. The difficulty was got over in one of three ways: the body of Christ was either considered a real earthly body, but not belonging essentially to his nature, and only assumed for a time; or it was declared to be a mere appearance or illusion; or, finally, it was believed to be a heavenly body, composed of ethereal substance, though having the appearance of being material. All the Gnostic heretics held docetism in one or other of these three forms, with the exception of those who were led by the same difficulty to deny the divine nature of Jesus Christ, and reduce him to a mere human sage. While the first of these alternative forms of heresy seems to have completely died out, the last, under various names, has continued to the present time. For a clear and learned account of docetism, consult Neander's *Dogmengeschichte* (History of Doctrine). English by J. E. Ryland; published by H. G. Bohn, in 2 vols., 1858.

DOCK, *Lapathum*, a sub-genus of the genus *rumex*, the other species of which are generally called sorrel (q.v.), containing those which are not acid, and of which the flowers are hermaphrodite. They are large perennial herbaceous plants, natives chiefly of temperate climates, with large generally lanceolate or ovate leaves, and panicles of small greenish flowers. They have great tap-roots, and are with difficulty eradicated from pastures. They also multiply rapidly by seed. The best mode of dealing with them, is generally found to be repeated cutting away of their leaves and shoots, by which the plants are killed. Many of the species prefer watery places. A number are natives of Britain, and several of the European ones have found their way to North America, where they have become troublesome weeds, a number of really indigenous species being also found there. Useless and even troublesome as the D. is generally esteemed, yet the large astringent roots are capable of being beneficially employed in medicine; and those of the great water D. (*R. hydrolapathum*) in particular—for which the Druids entertained a superstitious veneration—are administered as an antiscorbutic.

DOCK is any space or structure in or upon which a ship may be berthed or held for loading, unloading, repairing or safe-keeping. The water-space may communicate freely with the stream or harbor, or the entrance to it may be closed by a gate or by a lock. If provided with a lock or gate, the level of the water within the dock remains at all

times nearly the same, as the gate is opened only at full tide when the level without and within is the same. If a lock is employed, vessels can pass in and out at all stages of the tide, but this does not materially affect the level of the water inside the dock. In an open dock the tide continually lowers or raises the vessel, and this interferes to some degree with the work of loading or unloading. The closed docks are free from this inconvenience, while a greater advantage is found in the absence of currents. In a larger sense the term dock is also applied to a basin or enclosed water-space for the storage of floating timber, or the safe keeping of river steamers, barges or canal boats laid up for the winter, and by a further extension is made to include the wharves and warehouses on or in the neighborhood of a dock. The great rise and fall of the tides about Great Britain has brought into use a remarkable system of docks for the loading and unloading of vessels in such ports as London, Liverpool and Glasgow, which are not required in American ports. To explain this it is only necessary to state that the rise and fall of the Thames at London Bridge, which is the head of navigation for sea commerce, is 19 feet, while in Liverpool the variation between high and low water is much greater. The shipping of London and that of Liverpool are of nearly equal magnitude, and the docks of both cities form wonderful networks of basins, those of Liverpool, taken collectively, being more modern than those of London. There are also extensive docks on the opposite side of the Mersey at Birkenhead. There are 28 docks controlled by the Mersey Docks and Harbor Board, the principal being: North and South Carriers, Canada, Huskisson, Sandon, Wellington, Bramley-Moore, Nelson, Salisbury, Collingwood, Stanley, Clarence, Trafalgar, Victoria, Waterloo, Princess, Georges, Canning, Albert, Salthouse, King's, Wapping, Queen's, Coburg, Brunswick, Toxteth, Harrington, and Herculaneum. *These vast docks were begun about a century and a half ago, but the great development has been, of course, within the present century. The combined dock area of Liverpool and Birkenhead is about 425 acres of water area and the quay line measures 18 miles in Liverpool and 9 miles in Birkenhead, or 27 miles in all. Among these basins are numerous graving docks, the total bottom length of which is about 15,000 ft. The excellence and abundance of Portland cement has been the cause of making most of the later docks to be built of concrete, and throughout, these docks give evidence of the most substantial construction.

The dry docks of the Thames are very numerous and of almost every size from 140 feet on the blocks up to 520 feet. A great many of them are built of wood, and wooden gates are common, but the principal docks are of masonry or concrete. The most extensive docks on the Thames are those recently constructed at Tilbury, about 15 miles below London. These docks comprise a tidal basin, the entrance to which is 100 yards in width. The entrance to the main basin is through a lock 80 feet in width. The walls are of concrete and the gates of the large lock are made of iron plates, which are opened and closed by hydraulic power. Four large graving docks form a feature of these works. These may be filled with water from the tidal basin or from the main dock through culverts. The total area of the outer tidal basin is 19½ acres. It contains 26 ft. of water at low tide and 46 feet at high tide. The main basin covers about 23 acres and has a depth of 38 feet. Three branch docks contain 9½, 9½ and 11 acres. These figures are sufficient to illustrate the magnitude of the work. The city of Glasgow also may be mentioned as having large dock accommodation. There are various kinds of docks used in repairing and building ships, such as depositing dock, dry dock, floating dock, graving dock, sectional dock, and so forth. A depositing dock is a caisson or an elevator for lifting vessels from the water and placing them upon stagings or wharves erected for the purpose. The lifting apparatus consists of a series of caissons or pontoons, placed side by side and joined at one end to another pontoon that, with a series of upright tubular structures, forms a girder and makes the back of a comb-like structure, of which the pontoons are the teeth. In the rear of the girder is a large floating pontoon, connected with it by two rows of heavy booms that, being pivoted at each end, serve as a series of parallel bars and keep the entire structure upright while afloat. To lift a vessel, a row of blocks with shores and chocks is arranged on top of all the pontoons. The air is allowed to escape, and the entire structure, except the float in the rear, sinks until the vessel can be floated over the pontoons. When the vessel is in position the water is pumped out of the pontoons, and they all rise together, lifting the vessel out of the water.

Dry Dock, a dock or an excavated basin adjoining navigable water, provided with a gate, and so arranged that after the docking of a ship the water can be exhausted from it. Such docks are long and narrow, with sloping sides formed into steps. The pioneer in the building of timber dry docks in this country was Mr. J. E. Simpson, who for many years upheld the superiority of wood over stone for these structures. Their original cost is comparatively low. They resist the action of frost much better than do stone docks, and consequently the repairs required are less. In some weather ice is not so liable to form and remain upon wood as on stone, and they are lighter, so that work can be carried on in them longer than in stone docks. The first dock of this type was built in Boston in 1853 and 1854, and is still in use and in fair condition. At the government navy yards timber dry docks are replacing the older granite ones. These docks represent an excavated basin or slip lined throughout with Georgia pine timber, with sides and inner end sloping to the floor. The outer end is open, and is provided with heavy sill and abutment timbers. An iron caisson fits this opening and acts as a gate. The general dimensions are as follows: Length over all coping, 530 feet; length over all inside of caisson, 500 feet;

width on top amidships, 130 feet 4 inches; width on floor amidships, 50 feet; width on floor at entrance, 53 feet; depth of gate sill below high water, 25.5 feet; depth at centre, 25.7 feet. The floor, 460 feet by 50 feet, is surrounded by eight-inch tongued and grooved sheet piling. In good ground the practice has been to drive this down 7.5 feet, but in some instances, notably at the Brooklyn navy yard, where quicksands have been struck, it was driven down to 45 feet. The area included in this sheet piling contains round piles, driven in rows, three feet between centres transversely, and four feet in the direction of the length of the dock. Each row of piles carries a longitudinal square timber of Georgia pine. Upon these rest cross timbers three feet between centres, to which the bottom planking is spiked or bolted. Special rows of piles are driven to carry the keel blocks; a space ten feet wide beneath the centre of the dock contains extra closely spaced piling for this purpose; the timber used is generally about one foot square, and the piling one foot in diameter. Under the floor and surrounding the heads of the piles is a bed of Portland cement concrete, five feet thick at the centre, and rising toward each side between the transverse timbers to the height of one foot, giving a maximum thickness of six feet. Any water that may find its way thereto runs down to the central axis of the dock, owing to this slope. From each side of the floor the sides rise in steps with a slope of about 39°. They are lined with pieces of 10-inch plank, 11 inches in greatest height, but chamfered off at their rear and lower corner, so that their vertical face is only 3 inches high. They run horizontally around the dock, forming steps 8 inches high and 10 inches wide upon the parallel sides. These pieces, termed alters, are of Georgia pine, and are bolted to side-brace timbers, whose lower ends abut upon the floor timbers, and also against square longitudinal timbers bolted to the floor and representing the bottom alter. From the coping line tongued and grooved sheet piling is driven well below the floor level of the dock, so as to completely surround it. These docks are closed by floating caissons, which are iron vessels with sloping stern pieces that exactly fit the dock entrance. A heavy India-rubber packing is carried around the entrance sills and abutments against which the caissons bear. Two sills are provided, an outer and an inner one, which enables repairs to the inner or main sill to be attended to. For emptying the Brooklyn dock very powerful steam machinery has been provided. It consists of two centrifugal pumps of 42 inches diameter, driven by two vertical engines 28 inches diameter of cylinder by 24 inches stroke. Three steel boilers 13 feet in diameter by 11 feet in length supply the steam. The pumps have a capacity of 80,000 gallons a minute and can empty the dock in one hour and a half, when no vessel is in it. Open sluice-ways are made in the concrete floors on each side of the keelway, which lead to a drainage culvert and pumping well. The filling is done through the caisson culvert, with valves run through its body transversely. The caisson having been hauled across the mouth of the dock, water is admitted until it sinks into place, thus closing the dock water-tight. The pumps are then started and the water pumped out of the dock; as the ship settles down on the keel blocks she is kept upright by means of shores from her sides to the steps of the dock.

FLOATING DOCK, a capacious wooden or iron structure generally rectangular, and intended to serve as a graving dock. Sometimes floating docks are built in water-tight compartments, and can be sunk to the required depth by the admission of water to these compartments. When the vessel is docked, the floating dock is raised by pumping, till its bottom touches the keel of the ship. Shores are then added to keep the ship in position, and the dock is raised still higher. Instead of compartments, water-tight tanks are occasionally used, and the dock is raised and lowered on the same principle. A floating dock may also be made so heavy as to sink of its own weight deep enough to receive the largest ship, and be raised by means of empty water-tight tanks, which lift dock and ship by their buoyancy.

The hydraulic dry dock at San Francisco, into which the largest ocean steamers are lifted from the water to the level of the land, has a platform 450 long and 66 feet wide, composed of 36 steel transverse girders, 6 feet 4 inches deep. This is elevated by 36 hydraulic cylinders, one opposite each end of the girders, each cylinder containing a plunger with a vertical movement of 15 feet, and a lifting power of 8000 tons, and moved by hydraulic power.

Two vertical engines of 12-inch diam. and 16-inch stroke, making 120 revolutions, maintain the water pressure. An automatic accumulator regulates the steam furnished, and massive steel chocks work in harmony with the plungers, sliding into place when the platform with its load is lifted.

GRAVING DOCKS, are so called because they are used in graving or cleaning the bottom of ships. See **DRY DOCK**, above.

HALF-TIDE DOCK is a basin connecting two or more docks and communicating with the entrance basin.

SECTIONAL DOCK is a floating dock composed of a succession of pontoons or caissons attached to a platform below the vessel. Steam-pumps are used to remove the water from the caisson, and, as they float, the vessel is raised. The rise and fall of the tide makes docks in England of somewhat more importance than in this country, which accounts for the elaborate docking systems on the Mersey and on the Thames. There are, however, some very fine docks in this country for the more convenient handling of merchandise, such as grain, sugar and cotton, and for the care of valuable goods. The

Atlantic docks and the Erie basin, in Brooklyn, are examples. The Atlantic docks were commenced in 1841 and were several years in construction. More than 200 acres of land were secured by the Atlantic Dock Company, and 40 acres of low marsh land were converted into a basin. Excavation over the whole 40 acres was done mainly with dredging machines and was carried to a depth of 20 feet below low water mark. The outer enclosure was made with piers of cribwork, consisting of timber filled with stone which were sunk into trenches 30 feet below high water mark. The cribs were 25 feet thick at the base and were placed 150 feet apart, that being the width of the pier. In the basin are a number of wooden piers where vessels are loaded. Upon the cribwork piers large stone warehouses are built. On the inland side is the commercial wharf, 2000 feet in length. The Erie basin, near the Atlantic dock, contains two graving docks. The granite dry docks in the government yards are among the finest in the world, but having been built before the present types of vessels were introduced, they are too short and not of sufficient width for modern requirements. They cost when new, about two millions of dollars. Most of the foreign nations have very extensive docking facilities at their navy yards, those recently finished by the Italians being among the most perfect in their fittings and appliances.

DOCKET, in law, originally signified a summary, in very brief form, of a document endorsed upon it or attached to it, so that its tenor might be known without complete perusal. It is probable that these memoranda in time came to be transcribed in a book to which the name docket was then applied. This was particularly the case with records of judgments, and in the United States a register of money judgments is called a docket. Thus, with a judgment after a mortgage foreclosure and sale, only the money deficiency, if there be one, for which the defendant is still liable personally, is docketed; and the docket serves as a judgment lien on his real property within the registration of the court. But the main use of the word docket in the United States is as the name of a list of causes before the court for trial, entered in the order in which the case is to be called, in a book kept by the clerk of the court. Such a docket is called by the practice of some courts the calendar. The docket or calendar is called over at the opening of the court each day—or sometimes once a week—and at the request of counsel the case may in the discretion of the judge be removed to a less advanced stage on the docket or put on that for the next term of court. A special use of the word in England is for a copy of a chancery decree left with the proper clerk of the court for enrollment. The derivation of the word is the same as that of the verb *to dock*. Obsolete forms of the word are *docquet*, *doquet* and *dogget*.

DOCTOR (Lat. *docēre*, to teach), a teacher. Originally, the word doctor was used, in accordance with its etymological derivation, to signify a teacher in general, and it was not till the 12th c. that it became a title of honor for the learned, irrespective of the function of communicating knowledge. It had frequently appended to it, in those early days, some additional expression intended to characterize the peculiar gift of its possessor. Thus, Thomas Aquinas was called the Doctor Angelicus; Bonaventura, the Doctor Seraphicus; Alexander de Hales, the Doctor Irrefragabilis; Duns Scotus, the Doctor Subtilis; Roger Bacon, the Doctor Mirabilis; William Occam, the Doctor Singularis; Gregory of Rimini, the Doctor Authenticus; Joseph Gerson, the Doctor Christianissimus; Thomas Bradwardine, the Doctor Profundus; and the like. The word had long been used, even in the universities, as a general expression for a teacher before it came to designate a degree or rank in the learned hierarchy to which only the united body of the teachers could advance or promote the candidate. These formal promotions commenced at Bologna in the 12th c., and the learned Irnerius, the regenerator of the Roman law at that period, is said to have introduced the ceremonial which was afterwards universally adopted. Irnerius, however, is a sort of mythical hero in university history, and such statements with regard to him must be received with caution. See **PROMOTION**. The university of Paris almost immediately followed in the footsteps of Bologna, the first reception of doctors having taken place in the year 1145, in favor of Peter Lombard and Gilbert de la Porrée, the greatest theologians of the day. Subsequently to this period, the emperors were in use expressly to confer upon the universities the right of appointing doctors of laws by their authority and in their name. The example of the emperors was speedily followed by the popes, who conferred corresponding rights with reference to the canon law. From the 11th to the 13th c., there seems reason to believe that, both in Italy and France, the terms master and doctor were pretty nearly synonymous. In the German universities, the professors of theology were more commonly known as masters; and in the beginning of the 15th c., in accordance with the practice of the university of Prague, the distinction was pretty consistently made between doctors of law and medicine, and masters of theology and philosophy. In modern times, the title of doctor has been applied almost everywhere to the three faculties of theology, law, and medicine. In Germany, it extends to that of philosophy, in which, in this country, the older title of master is still retained. The doctor's degree is, in general, conferred at the instance of the dean of the faculty to which it appertains. It is granted either on examination, and after the ancient form, at least, of publicly

defending a learned thesis in Latin has been observed, or else it is an honorary degree, conferred in consideration of the general reputation of the recipient for eminence in some particular branch of learning, philosophy, or science. See DEGREE. In Germany, the doctor ranks before the untitled nobility and next to the knight; and amongst themselves, doctors take the rank of the faculties to which they respectively belong, the first being theology, the second law, and the third medicine. In Oxford and Cambridge, and recently also in the German universities, doctors of music have been created. In the latter country, also, learned ladies have occasionally shared the honors of the doctorate. Dorothea Schlözer received the degree of doctor of philosophy from the university of Göttingen in 1787; Mariane Charlotte von Siebold, that of medicine from Giessen in 1817; and Johanna Wittenbach, in philosophy, from Marburg in 1827. Of the four ancient degrees of bachelor (q.v.), master of arts (q.v.), licentiate (q.v.), and doctor, the modern university of France has retained only those of bachelor, licentiate, and doctor. Up to the period of the revolution, the highest consideration attached to the title of doctor of the Sorbonne (q.v.)—that famous theological faculty, which was called “the perpetual council of the Gallican church,” and of which the present faculty of theology of the academy of Paris is but a feeble and lifeless reproduction. But though the degrees of the Sorbonne continued to enjoy, and apparently to merit, some degree of respect, such was by no means the case with those of the other schools of learning in France. Furettiére, in his dictionary, defines a bachelor as a man who learns, and a doctor as a man who forgets. The ridicule of Voltaire, La Fontaine, Le Sage with his Doctor Sangrado, and Molière in the *Malade Imaginaire*, will readily occur to our readers as illustrating the position which was then held very generally by French doctors.

In England, the doctor's degree was not introduced into the universities till the reign of John or of Henry III. At first it was a very rare and highly prized honor, and the ceremony of conferring it was attended by scenes of feasting and revelry, of which curious accounts will be found in Antony à Wood's *History and Antiquities of the University of Oxford*. Colored engravings of the dresses worn by doctors of the several faculties at Oxford and Cambridge are given in Ackermann's histories of these universities. As to professional uses of the degree of doctor of civil law, see DOCTORS COMMONS.

DOCTORS' COMMONS, formerly the college of the doctors of civil law in London, wherein the court of admiralty and the principal ecclesiastical courts were held. It was founded by Dr. Henry Harvey, dean of the arches, previous to which time the doctors had lived in Paternoster row. The original building was burned in the great fire in 1666, when the doctors removed for a time to Exeter house. After some time the commons was rebuilt, and the doctors returned to their former quarters. The courts which had been wont to hold their sittings at doctors commons are—the court of arches, the archdeacon's court, the prerogative court, the faculty court, the court of delegates, and the court of admiralty. The prerogative court is now amalgamated in the probate court (q.v.), and the court of delegates (q.v.) is transferred to the judicial committee of the privy council. At the time when these courts were all in full operation, their times of session were regulated by terms, as in the courts of equity and common law, a certain day in the week being assigned to each court for hearing its causes. The court of arches, the archdeacon's court, the faculty court, and the court of admiralty, have been changed, and no longer continue to exercise their functions in this once famous spot. The court of arches (so called from having sat *in arcubus*, or under the arches or bows of Bow church, Cheapside) is the court of appeal belonging to the archbishop of Canterbury. The judge in this court is styled dean of the arches, and he has jurisdiction, as the archbishop's principal official, in all ecclesiastical causes within the province of Canterbury. He has original jurisdiction, also, in certain causes by *letters of request* (see LETTERS). It was by virtue of letters of request that matrimonial causes were tried in the court of arches; but this branch of its jurisdiction is now removed to the divorce court. The archdeacon's court is an inferior court for the consideration of ecclesiastical questions occurring within the archdeaconry. For an account of the other courts mentioned in this article, see the several heads to which they refer. The practitioners in the several courts to which we have alluded were the doctors of civil law, called in the ecclesiastical courts advocates and proctors, who performed similar duties to those of attorneys or solicitors in the courts of law and equity. Both classes of practitioners required, in order to their admission to practice, to obtain the fiat of the archbishop, and afterwards to be duly admitted by the dean of the arches. The form of admission was in both cases attended with much ceremony. The doctor elect was introduced to the presiding judge by two doctors habited in their scarlet robes. The candidate then made a short Latin speech, and was admitted to practice in the courts. The habit of the doctors is a scarlet robe with a hood, trimmed with taffeta or white minever. The proctors were, in like manner, introduced by two senior proctors. In 1857, power was given by 20 and 21 Vict. c. 77, to dissolve the college of doctors commons and sell the property. The proctors received compensation, and all solicitors are allowed to act as proctors, and all proctors were turned into solicitors, all being alike solicitors of the supreme court, 21 and 22 Vict. cc. 95, 108; 23 and 24 Vict. c. 27; 33 and 34 Vict. c. 28, s. 30; 40 and 41 Vict. c. 25, s. 17. Nevertheless the old names continue, and will no doubt

only by degrees cease to be used in reference to ecclesiastical courts and proceedings. For a full account of doctors commons, see Stowe's *London*.

DOCTRINAIRE (a French term derived from doctrine) signifies, properly, the scientific taking up and exposition of a subject, as opposed to a treatment which is merely external, and which rests on accidental characteristics. In general, however, it is used as a term of reproach, to characterize views which are pedantic, schoolmasterly, and impractical. In this sense it was applied in France, during the restoration, by the reactionary court-party to the fraction of the parliamentary opposition, who supported scientific doctrines of constitutional liberty against the arbitrary will of the monarch. This party, which had its rallying-point in the salons of the duc de Broglie, was led in the chamber by Royer Collard, and supported in the press and before the public by Guizot, and the younger members of what afterwards became the Orleans party. The development of the constitution on the basis of the *charte* of Louis XVIII., was the watchword of those men; but their real inspiration was derived from England. When the revolution of 1830 occurred, they became the advisers and ministers of the king of the French, and were more deeply imbued with the principles of constitutional monarchy than any other political party that has ever existed in France. The true fathers of the *doctrinaires* were Mounier, Lally Tolland, Clermont Tonnerre, Talleyrand, and the abbé Montesquieu; and the cradle of the party was the original *comité* of the constitution, which, about twenty-five years before, elaborated the *charte* of 1814. Its later representatives found a center in the court of the exiled queen Marie Amalie at Claremont, and a vigorous supporter in her gifted son, the duc d'Aumale.

DOCTRINE. See DOGMA.

DOD, ALBERT BALDWIN, D.D.; 1805-45; son of Thaddens; graduate of Princeton, and tutor in the college, 1827-29 and in 1830 chosen professor of mathematics. He lectured upon political economy and architecture.

DOD, DANIEL, 1788-1823; b. Va., educated at Rutgers college, and especially devoted to the construction of steam machinery. He began when steam navigation was in its infancy, and soon became one of the most successful engine-builders in the country. He met his death in consequence of an explosion of a boiler on a steamboat in which he was experimenting on the East river, New York.

DODD, MOSES WOODRUFF, b. New Jersey, 1814; graduated at the coll. of New Jersey, 1837; studied theology at Princeton and Union theol. seminaries, 1837-39; publisher and bookseller in New York, 1839-70.

DODD, The Rev. WILLIAM, LL.D., was b. in 1729 at Bourne, in Lincolnshire; was educated, in the first place at a private school; and was admitted in 1745, as a sizar to Clare college, Cambridge, where after five years of study, he took his degree of B.A. Shortly after, he removed to London, received orders from the bishop of that city, and soon after gained a reputation as a popular preacher and as a successful littérateur. Through his celebrity as a divine and man of letters, and by means of flattering the great, he succeeded well in London, and in 1763 was appointed tutor to Philip Stanhope, the fifth earl of Chesterfield. His habits, however, were very expensive, and an income of £800 per annum, even when augmented by the produce of his literary labors, was not sufficient to supply his wants. This extravagance proved his ruin, as it tempted him to forge the signature of his former pupil, the earl of Chesterfield, to a bond for £4,200. For this crime he was arrested in Feb., 1777, and though he refunded the money, he was tried, convicted, and executed on the 27th of July. His writings are numerous and varied. His *Beauties of Shakespeare* (2 vols., Lond. 1753) is well known, as are also his *Reflections on Death* (1763), and *Thoughts on Death*.

DODDER, *Cuscuta*, a genus of plants referred by some botanists to the natural order *convolvulaceæ*, and regarded by others as the type of a small distinct natural order *cuscutaceæ*; which differs from *convolvulaceæ* in the habit of the plants, leafless climbing parasites, with flowers in dense clusters; in having scales on the tube of the corolla alternate with its segments; and in having a spiral thread-like embryo, lying in a mass of fleshy albumen, whilst the cotyledons are so small that the embryo has been described as destitute of them. There are about 50 known species of *cuscutaceæ*, chiefly found in the warmer temperate parts of the globe. The name D. is often extended to all of them. One or two species of *cuscuta* are natives of Britain, parasitic on leguminous plants, heath, thyme, hops, nettles, etc. A species of D. is very injurious to crops of flax in Germany, and leguminous crops often suffer from this cause in the s. of Europe. The seed of D. germinates in the ground, but the stem soon seeks to attach itself to plants by little rootlets which it sends out, and the original root dies. The appearance of D. has been described as resembling "fine, closely tangled, wet catgut."

DODDER-LAURELS, *Cassythaceæ*, parasitic plants appearing generally like dodders, but in many respects resembling laurals. They grow only in hot regions, where they supplant the dodders. Only a single species is known in the United States.

DODDRIDGE, a co. in n.w. West Virginia, crossed by a division of the Baltimore and Ohio railroad; 475 sq.m.; pop. '90, 12,183, with colored. The surface is hilly; chief business, agriculture. Co. seat, West Union.

DODDRIDGE, PHILIP, D.D., an eminent dissenting preacher and author, was b. in London in the year 1702, and educated for the ministry at a theological academy at Kibworth, in Leicestershire, presided over by a Mr. John Jennings. In 1722, he became pastor of the dissenting congregation at Kibworth, and in 1729 received a call to Northampton, where he also became president of the theological academy now removed from Kibworth to that town. Here he continued to preach and train young students for the ministry till within a short period of his death, which occurred Oct. 26, 1751, at Lisbon, whither he had gone for the benefit of his health. D. was a man of the most amiable character, deep piety, and extensive accomplishments. His principal work is *The Rise and Progress of Religion in the Soul* (1750). It has been translated into Dutch, German, Danish, and French. Besides this, may be mentioned *The Family Expositor* (6 vols., 1760-62); his *Course of Lectures* delivered to the students under his charge, and published by the Rev. Samuel Clarke (1763); and a great variety of sermons on miscellaneous religious topics. D. also wrote a considerable number of hymns, which hold a high rank among those used by English and Scotch dissenters.

DODECAGON. A regular polygon of 12 equal sides and angles. See REGULAR PLANE FIGURES.

DODECAHEDRON, one of the five regular solids, is bounded by 12 equal and regular pentagons. See REGULAR PLANE FIGURES.

DODECATH'EON, plants of the order *primulaceæ*. A species in the United States called American cowslip, shooting-star, and pride of Ohio, is a beautiful plant.

DÖDERLEIN, LUDWIG, a German philologist, was b. at Jena, 19th Dec., 1791; studied at Munich, Heidelberg, Erlangen, and Berlin; and in 1815 was appointed professor of philology at the academy of Berne. About the year 1820, he went to Erlangen as second professor of philology, and in 1827 became first professor and also director of the philological seminary. He died in 1863. His principal works are *Lateinische Synonymen und Etymologien* (6 vols., Leip. 1826-38); *Lateinische Wortbildung* (Leip. 1838); *Handbuch der Lat. Etymologie* (Leip. 1841); *Homerisches Glossarium* (3 vols., 1850-58). D. also edited several classical works, such as the *Œdipus Coloneus* of Sophocles, and the *Opera* of Tacitus.

DODGE, a co. in south central Georgia, formed in 1870, on the two Ocmulgee rivers, and intersected by the Southern railroad; about 414 sq. miles. Co. seat, Eastman. Pop. of co. '90, 11,452.

DODGE, a co. in s. e. Minnesota, crossed by the Chicago and Northwestern railroad, and drained by the tributaries of the Zumbro river; 430 sq. m.; pop. '90, 10,864. It is mostly a level and fertile prairie. Agriculture is the chief business. Co. seat, Mantorville.

DODGE, a co. in central Nebraska, n. of the Platte and intersected by the Elkhorn; crossed by the Union Pacific and other railroads; 520 sq. m.; pop. '90, 19,260. The productions are corn, wheat, oats, etc. Co. seat, Fremont.

DODGE, a co. in s. e. Wisconsin, on Rock river, crossed by several railroads; 900 sq. m.; pop. '90, 44,984. The surface is prairie with oak openings, and there are forests of ash, elm, maple, etc. The soil is very fertile. Co. seat, Juneau.

DODGE, MARY ABIGAIL (known in literature as "GAIL HAMILTON"), a brilliant, witty, and satirical writer; was born at Hamilton, Mass., about 1830, and was a school teacher in her youth. Among her works are *Country Living and Country Thinking* (1862); *Gala Days* (1863); *Woman's Wrongs* (1868); *The Battle of the Books* (1870); *Woman's Worth and Worthlessness* (1871); *Sermons to the Clergy* (1875); and *Our Common School System* (1880). Residing in Washington for many years she contributed vigorous letters to newspapers and periodicals on political subjects, and in the winter of 1890-91 conducted a Bible-class for adults in that city, giving the public the benefit of her "talks" in *A Washington Bible-Class* (1891). She d. in 1896.

DODGE, MARY ELIZABETH MAPES, b. New York, in 1838. She married when very young; was soon after left a widow with two children, and turned to literature as a means of support; contributed to many of the leading periodicals, and pub. *Irvington Stories*; *Hans Brinker, or the Silver Skates*, which has gone through several editions in this country, has been translated into five foreign languages, and was awarded a prize of 1500 francs by the French academy; *Theophilus and Others*; *Donald and Dorothy*, etc. She has been editor of *St. Nicholas* since its foundation.

DODGE, WILLIAM EARLE b. Conn., 1804; for many years a merchant of New York, where he became known as president of the American Bible society, and in connection with the Young Men's Christian Association, and as active in many philanthropic and benevolent efforts. He was one of the members of the peace convention of 1861, and a member of congress in 1865-67. He d. 1883. There is a statue of him in New York.

DODGSON, CHARLES LUTWIDGE, M.A., was born in England in 1832, graduated at Oxford University in 1854, entered the church in 1861, was mathematical lecturer at Christ Church College, 1855-81, and has written *A Syllabus of Plain and Algebraical Geometry* (1860); *Elementary Treatise on Determinants* (1867). He has achieved, under the pen name of Lewis Carroll, a world-wide fame, however, for his amusing books *Alice's Adventures in Wonderland* (1865); *Through the Looking Glass* (1871); *Sylvie and Bruno* (1889), etc.

DODINGTON, GEORGE BUBB, Baron Melcombe, 1691-1762; an English politician, graduate of Oxford, and in 1715 member of parliament. In 1716 he was envoy to Spain. In 1720 he inherited his uncle's vast estate, and built a mansion in Dorsetshire at a cost of \$700,000. He gathered around him the *litterati* of the time, among whom were Young, Thomson, and Fielding. In politics he was variable. His diary from 1749 until near his death, gives a vivid picture of the politics and manners of the time.

DODO, *Didus*, a genus of birds formerly ranked among the *Oreipennes* (q.v.) or struthious birds (ostrich, cassowary, etc.), although exhibiting very anomalous peculiarities; but still more interesting because, whilst it appears to be now completely extinct, its extinction has taken place very recently, and through the agency of man; at least one species (*D. ineptus*) being known to have existed less than 200 years since. It is described by several voyagers of the 16th and 17th centuries, and seems even to have been brought alive to Europe. It inhabited the islands of Bourbon and Mauritius. That any species of *D.* was ever seen by European voyagers in Madagascar, is not so certain; and the solitaire (q.v.) of the island of Rodriguez, now also extinct, was a very different bird. The *D.*, according to the descriptions given of it by those who saw it, and which are confirmed by pictorial representations, apparently not unworthy of confidence, was a bird larger than a swan; of a very heavy, clumsy form and corresponding gait, with short thick scale-covered legs; three rather short toes before and one behind; large head; very large bill, the upper mandible longer than the under, and much hooked at the point; the wings so short as to be of no use for flight, and furnished only with a few black feathers; the general plumage a kind of grayish-down; the tail merely a tuft or bunch of curiously curled feathers. The *D.* was so abundant when some of the first voyagers visited Mauritius, that they became satiated with its flesh, although they describe it, particularly the breast, as good for food. The birds were easily killed, being wholly unable to fly, and running slowly. Their speedy extinction after the islands began to be visited and settled, is thus easily accounted for. The *D.* seems to have been adapted for living in tropical woods, where the luxuriant vegetation afforded it a ready supply of food, and its powerful hooked bill, which has led some naturalists to assign it a place among birds of prey, was probably intended for tearing vegetable and not animal substances. However singular this bill is in a struthious bird, it has been well remarked that it is not more so than the very different bill of the *apteryx*.

There are rude figures of the *D.* in several works of the 17th c., and in particular one, evidently superior to the rest, in Bontius (edited by Piso, 1658)—who calls the bird *dronte* or *dodaers*—which perfectly correspond with the descriptions given of it, with a painting preserved in the British museum, said to have been drawn in Holland from the living bird, and with a representation of it discovered by prof. Owen in 1838 in Savery's picture of "Orpheus and the Beasts" at the Hague, which he thinks "must have been copied from a study of the living bird." A foot of the *D.* is amongst the valued treasures of the British museum.

DODONA, a city of Epirus, the seat of the oldest Grecian oracle there, is situated in one of the wildest districts s.w. of the lake of Janina. The Greek and Egyptian accounts of its origin differ. The priests of Jupiter in Egyptian Thebes related that two holy women were carried off from that city by a party of Phenicians, one of whom was sold in Libya, the other to the Greeks, and that these women founded the oracles at *D.* and Ammon. The inhabitants of *D.* related that two black doves took their flight from the city of Thebes, in Egypt, one of which flew to Libya, the other to *D.*; that the latter perched upon an oak, and with a human voice commanded that an oracle should be founded on the spot. Herodotus is of opinion, that if the Phenicians did actually carry off the two women already alluded to, one of them was probably sold into Greece; that the strange language and dark complexion had caused them to be likened to birds; and that when they became acquainted with the Greek tongue, they were said to have spoken with a human voice. Later authors ascribe the founding of the city to Deucalion. The sanctuary itself was dedicated to Jupiter, who manifested himself from the boughs of an oak, probably by the noise of the wind through the tree. This was explained by the priests, who were termed *selloi* or *helli*. The goddess Dione, by some said to be Aphrodite, by others Hera, afterwards appeared by the side of Jupiter, and the place of the priests was occupied by priestesses, who announced the will of the deity. *D.*, though not equal in renown to Delphi, was yet frequently consulted on occasions of importance, both by the Spartans and Athenians. Though the city of *D.* was destroyed in 219 B.C. by the *Ætoli*ans, it recovered at a later period, and was in existence in the 6th c. A.D. See *Dodone et ses Ruines*, by Carapanos (1878).

DODSLEY, ROBERT, author and publisher, was born in 1703, near Mansfield, in Nottingham. His father, who is said to have been a schoolmaster, apprenticed him to a stocking-weaver; but finding this employment unsuitable, *D.* ran away, and was afterwards engaged as footman. While thus employed he devoted his leisure moments to reading and the cultivation of letters, and eventually published, in 1732, a volume of poems entitled *The Muse in Livery, or the Footman's Miscellany*. His next production, *The Toy Shop*, a dramatic piece, was submitted in manuscript to Pope, who undertook to recommend it to Rich, the manager of Covent Garden theater. It was acted under Rich's management in 1735 with great success. The proceeds resulting from the publication of these his first two works enabled *D.* to commence business as a bookseller.

in which trade he was very successful. In 1737, his *King and the Miller of Mansfield* was brought out at Drury Lane, and met with an enthusiastic reception. This was followed by *Sir John Cockle at Court*; *The Blind Beggar of Bethnal Green*; and *Rex et Pontifex*, which were republished in a collected edition of his dramatic works with the title of *Trifles* (1748). Meantime, he was conducting his business with such ability and spirit, that in the course of three years after commencement he was in a position to buy copyrights. In 1738, he bought Johnson's *London*, giving for it no more than ten guineas. His most successful work was a tragedy called *Cleone*, which was acted at Covent Garden with extraordinary success. On its publication, 2,000 copies were sold the first day, and within the year the work ran through four editions. With *Cleone* he closed his career of dramatic authorship. D. was connected either as contributor or publisher, and occasionally as both, with several magazines. He is, however, chiefly remembered now on account of his *Select Collection of Old Plays* (12 vols. 8vo, 1789); and his *Collection of Poems by several Hands* (4 vols. 12mo, 1748). Besides the volume entitled *Trifles*, another volume of his collected works was published in 1772 under the title of *Miscellanies*. He died in 1764.—See Knight's *Shadows of the Old Booksellers* (1865).

DODWELL, EDWARD, 1767-1832; an English antiquarian writer and draughtsman. From 1801 to 1806 he traveled in Greece, and spent the rest of his life for the most part in Naples and Rome. He wrote *A Classical and Topographical Tour through Greece*, and *Views and Descriptions of Cyclopean and Pelasgic Remains in Italy and Greece*, the last profusely illustrated. His widow, who was 30 years his junior, became the countess of Spaur, and was conspicuous, not only for beauty, but in the political life of Rome.

DODWELL, HENRY, 1641-1711; a native of Dublin, educated at a free school, and by the death of his parents reduced to great poverty. He became a fellow of Trinity college, and in 1688 was elected Camden professor of history at Oxford; but in 1691, he was deprived of his professorship for refusing to take the oath of allegiance to William and Mary. The remainder of his life was devoted to literary labors in chronology and ecclesiastical polity, and resulted in a number of valuable works. In religion, he was extreme, at one time promulgating the notion that immortality could be enjoyed only by those who had received baptism at the hands of one set of regularly ordained clergy, and was therefore a privilege from which dissenters were hopelessly excluded; again arguing from Scripture and the early fathers that the soul of man is naturally mortal, and gains continuance by only the special act of God. His son HENRY was the author of *Christianity not founded on Argument*, to which WILLIAM, another son, published a reply.

DOE, JOHN, the fictitious plaintiff in ejectment, whose services are dispensed with since the abolition of the fiction. See EJECTMENT.

DOESBORGH (*Drususburg*), a t. in the Netherlands, province of Gelderland, lies 11 m. e.n.e. from Arnhem, on the right bank of the Yssel. It was formerly fortified, but the walls have been broken down, planted with trees, and formed into pleasant promenades. An intrenched camp has been constructed on the n.e. side, between the Yssel and Old Yssel, which here unite. The streets are broad, and many of the houses handsome. There are several benevolent institutions, a grammar-school, boarding-school for boys and girls, and good public schools. The trade is considerable. Ship-building, book-printing, the making of eau de Cologne, preparing mustard, etc., are carried on. Pop. 4484.

DOFFER is that part of a carding-machine which takes the cotton from the cylinder when carded. See CARDING.

DOG, *Canis*, a genus of digitigrade carnivorous quadrupeds (see DIGITIGRADA; CARNIVORA), which, according to Linnæus, included all now forming the family *canidæ* (q.v.), and hyenas. In the genus as now restricted, wolves and jackals are generally included by naturalists, along with those animals to which alone the name dog is popularly applied, and a distinctive character of principal importance is found in the pupil of the eye, which is always round—contracting circularly, whilst in foxes it assumes the form of a section of a lens when contracted. The present article is limited to dogs in the common acceptation of the term, wolves and jackals being the subjects of separate articles; and only remarks relative to dogs in general will here find a place, many of the particular kinds being sufficiently important to be separately noticed.

At the very outset we encounter one of the most perplexing and difficult questions in natural history, as to the number of *species* of dog, and the origin of the domestic dog; two questions in appearance, but rather one in reality, and one on which the opinions of the most eminent naturalists are very much divided. According to some, all domestic dogs are to be regarded as of one species; and as in the case of some other valuable domestic animals, that species is not certainly known to exist in a truly wild state, all the wild dogs which must be admitted to belong to the same species being viewed as the offspring of domestic dogs which have returned to a wild state, and in which, however, it is supposed that the original type or characteristics of the species, modified by domestication, have in a great measure reappeared. According to others, there are numerous species of dog, originally distinct, which have been domesticated

by the inhabitants of different countries, but which, however, are very nearly related not only in their physical characters but in their dispositions and in some of their principal instincts, and which were capable of intermixing, not perhaps indiscriminately, but within certain limits, and so as to produce new races. By some who hold the first of these opinions, it is further maintained that the wolf and the dog are one species, and that all domestic dogs are derived from the wolf; whilst others advocate the claims of the jackal to be regarded as their original parent and type. By some of those who hold the species to be numerous, it is supposed not improbable that the blood of wolves and of jackals may be mixed in some of the domestic races with that of the original dogs. It is impossible for us to do more than state these different views, and a few of the principal arguments by which they are supported.

It is admitted on all hands, that there is great diversity among the different kinds of domestic dogs, many distinct races having long existed, which differ not only in size and other physical characters, but to a notable extent also in dispositions and instincts; it is further admitted that there appear to be no definite limits to the possible intermixture of these races with each other. So great is the diversity of physical characters, that naturalists of the greatest eminence almost acknowledge themselves incapable of pointing out any that are common to all dogs, and yet distinguish them all from the different species of wolves and jackals; and in fact, the *recurved tail*, not apparently a character of the first importance, is named by Cuvier himself as the most certain and unvarying specific distinction. The obliquity of the eyes of wolves is also contrasted with the more forward direction of those of dogs, which is accounted for—in favor of the theory of wolfish origin—by the supposition that it results from “the constant habit, for many successive generations, of looking forwards to their master, and obeying his voice.”—Bell’s *British Quadrupeds*. This, on the other side, is treated with ridicule; it is certainly a transition from the region of observation and ascertained fact to that of mere theory and conjecture. In size, dogs differ so widely that one is not as large as the head of another; the difference in form of body, head, or limbs, is almost equally great between the Newfoundland dog or the mastiff and the greyhound. The gradations, however, from one form or character to another, render it impossible to draw a fixed limit. In some races of dog, the hind-feet as well as the forefeet have five toes, instead of four, which is more common; but this has not been much insisted on as a ground of specific distinction. Greater value ought perhaps to be attached to the want in some, as the dholes (q.v.) of India, of the second tubercular tooth in the lower jaw; the hairiness of the soles of the feet of some is perhaps also not unimportant; and in favor of the opinion that domestic dogs have originated from an intermixture of several species, it has been urged that the number of teats in the female varies, and that there is sometimes even a difference between the number on one side and on the other, which has never been observed to be the case in wild dogs, and in them the number in the same kind is always uniform. Some of these points, however, have not received the investigation necessary to a confident determination of the measure of importance which ought to be assigned to them.

It seems to have been too hastily taken for granted, in favor of the opinion that there is only one species of dog, that all the wild races, even the dholes and the dingo, have sprung from domestic progenitors. There is certainly no evidence of this; and the fact that wild races exist, exhibiting marked diversities of character, in countries widely remote and of very different climates, is referred to with confidence on the other side, as affording at least a strong presumption in favor of the supposition that man has, in different countries, domesticated the species which he found there. We do not yet know enough of the amount and limits of the changes which circumstances and climate may produce, to warrant any confident conclusions on that ground. And if we were to adopt the views of those who ascribe least to such causes, we might yet demand them to show why, although from certain original types no mixed race can originate, there may not yet be other original types capable of such combination, or why the limits must be held equally impassable between all that were framed by an original act of creation. That there was only one original pair of the human race, may be held, without our of necessity holding that there was only one original pair of dogs. But to this consideration due place has, perhaps, scarcely been given.

That the common fox—or any species of fox—is a parent of any race of dogs, is not the opinion of any naturalist. Some dogs have a somewhat fox-like appearance, and indeed it is now generally admitted that the dog and fox will breed together, but as it has not been proved that the individuals of the cross will breed together, this fact does not warrant the assertion that the dog and fox belong to the same species. Instances of commixture between the dog and wolf have occurred in greater numbers, and without the compulsion of confinement, but in this case, too, the only recognized proof of identity of species—namely, the permanent fertility of the progeny—is wanting.

In favor of the specific identity of the dog and wolf, one of the strongest arguments is drawn from the equality of the period of gestation—63 days. But it may be remarked that an inequality of the period would have afforded a much stronger argument on the other side.

Against the identity of the dog and wolf, the difference of disposition has been strongly urged. In reply, it is shown by well-authenticated instances that the wolf is

very capable of that attachment to man which so remarkably characterizes the dog. There is greater value, perhaps, in the argument of col. Hamilton Smith, that "if domestic dogs were merely wolves modified by the influence of man's wants, surely the curs of Mohammedan states, refused domestic care, and only tolerated in Asiatic cities in the capacity of scavengers, would long since have resumed some of the characters of the wolf."

Buffon's notion, that the shepherd dog is the original type of the whole species, from which all dogs are derived, is merely fanciful, and his endeavor to support it by a comparative view of the different kinds, only exhibits a certain amount of ingenuity.

The shepherd's dog is one of the kinds of dog having greatest development of brain, but it is still greater in the spaniel. The skulls of dogs, however, neither exhibit very marked distinctions when compared with each other, nor when compared with those of wolves and jackals.

It is universally believed that the diversity of color exhibited by many dogs is a result of domestication, as it is neither found in those which may be supposed to exist in a state of original wildness, nor in those wild races which are certainly known to be the progeny of domestic dogs, a return to uniformity of coloring being apparently one of the most speedy consequences of a return to wildness. Black, reddish-brown, and white, the uniform colors observed in wild dogs, are, however, the colors which chiefly appear mixed in domestic races.

Pendulous ears are generally regarded as another result of domestication in dogs, as in rabbits; and it is certain that the wild races known have erect and pointed ears; but no wild race has been discovered at all corresponding to the mastiff in some of its other most notable characters, particularly the shortness of the muzzle, and depth of the chops, and it has therefore been conjectured that this and kindred races may have derived their origin from some wild dog of the interior of Asia, which has not yet come under the notice of any scientific observer.

The dog has been a domestic animal from a very early period. The earliest allusions to it are in the books of Moses, but they indeed correspond with the dislike and contempt still commonly entertained for it by many of the nations of southern Asia. By Homer, however, it is very differently mentioned; and "there is not a modern story of the kind which can surpass the affecting simplicity with which the poor dog's dying recognition of his long-lost master is related by one who wrote, probably, not less than 2,700 years ago." The sculptures of Nineveh, and the hieroglyphics of Egypt, attest the very early domestication of the dog, and the existence of races similar to some of those which exist at the present day; and the high value attached to it by many nations is further attested by the place assigned to it, or its image, as emblematic of the attributes which they ascribed to their gods. We do not now set so high a value on the dog, in consideration of mere usefulness to man, as on some of the other domestic animals; yet to the savage it is perhaps the most important of all, and some have supposed that by its aid the subjugation of other animals may have been first accomplished. Cuvier makes the strong assertion, that the dog "is the most complete, the most singular, and the most useful conquest ever made by man." The dog, far more than any other animal, becomes a humble friend and companion of man, often seeming actually to know and sympathize with the joys and sorrows of his master; and on this account it is, that he is alike "the pampered minion of royalty, and the half-starved partaker of the beggar's crust."

The uses to which the dog is applied are numerous, and correspond, in some measure, not only with distinct physical characters, but with remarkably distinct instincts of different breeds. Thus, whilst in some countries dogs are chiefly employed as beasts of draught, particularly for drawing sledges in the frozen regions of the north, and in other countries chiefly for the chase, the exquisite scent of some kinds, and the remarkable fleetness of others, variously recommending them for this use, we find them also rendering important services in the care of sheep and other cattle, and endowed with hereditary instincts wonderfully fitted for this purpose, and we find them, with like adaptation of instinct, highly valuable in watching and protecting the abodes and properties of their masters. Not the least interesting of the employments to which the dog has been devoted by man, is that of leading about the blind, which is often done with an intelligent and affectionate solicitude highly worthy of admiration.

Anecdotes illustrating not only the instincts, but the intelligence and affection of dogs, are familiar to every one, and form one of the most pleasing parts of many a book of natural history. Attractive to children, they are worthy of all the consideration which they can receive from the most philosophic mind. Volumes have been filled, and more volumes might easily be filled, with anecdotes well authenticated, and well worthy of preservation.

The dog produces usually from six to ten young ones at a birth. They are born blind, open their eyes about the tenth or twelfth day, attain their full growth in about two years, seldom live more than twelve or fifteen years, and almost never more than twenty.

No satisfactory classification of the different kinds of dog has ever been made. What some naturalists regard as types of species, others pronounce to be mere mongrel varieties. Nor can any principle of arrangement be found in form, roughness or smooth-

ness of fur, or other such character, which will not associate kinds that are in other respects widely dissimilar, and separate some that are nearly allied.

Col. Hamilton Smith arranges domestic dogs in six groups or sections: 1. "The wolf dogs," including the Siberian dog, Esquimaux dog, Iceland dog, Newfoundland dog, Nootka dog, sheep dog, great wolf dog, great St. Bernard dog, Pomeranian dog, etc. 2. "The watch and cattle dogs," including the German boar-hound, Danish dog, matin, dog of the North American Indians, etc. 3. "The greyhounds," including the Brinjarree dog, different kinds of greyhound, Irish hound, lurcher, Egyptian street dog, etc. 4. "The hounds," including the bloodhound, old southern hound, staghound, foxhound, harrier, beagle, pointer, setter, spaniel, springer, cocker, Blenheim dog, water dog or poodle, etc. 5. "The cur dogs," including the terrier and its allies. 6. "The mastiffs," including different kinds of mastiff, the bull dog, pug dog, etc. Col. H. Smith does not include in any of these groups the dholes, dingo, etc., which he even separates from the genus *canis*.—Mr. Richardson arranges dogs in three great groups, "indicated by the least variable part of their osteological structure, cranial development." 1. Including the Irish wolf dog, highland deerhound, all kinds of greyhounds, and the tiger hound, characterized by *convergent* parietal bones, an elongated muzzle, and high and slender form. 2. Including the great Dane, the French matin, the pariah of India, the bloodhound, staghound, foxhound, harrier, beagle, pointers, terriers, turnspit, Newfoundland dog, Labrador dog, Pomeranian dog, Esquimaux dog, Siberian dog, Iceland dog, shepherd's dog, etc., characterized by *parallel* parietal bones, and generally by much acuteness of smell. 3. Including mastiffs, the great St. Bernard dog, bull dog, pug dog, etc., characterized by sensibly *divergent* parietal bones, bulk of body, robust structure, and combative propensities.

See Burges, *American Kennel and Sporting Dogs* (1876); Walsh, *The Dog in Health and Disease* (1879); Shaw, *Illustrated Book of the Dog* (1884).

DOG. In law a distinction is made in regard to the rights of property in animals between those of a wild nature (*feræ nature*) and those of a domestic kind; the dog belongs to the latter classification. In the United States statutes exist in probably all the states which directly or by implication recognize the right of property in dogs and permit such ownership, though usually under special regulations. Often restrictions are laid down also by municipal laws. The right of property implied in the ownership of dogs carries with it the responsibility for illegal injury caused by the animal, and also makes the theft of it a punishable offense. Both by common law and by statute the keeping of vicious or dangerous dogs is in itself illegal unless proper precautions are taken to make any injury by them impossible. One who maintains a vicious or dangerous animal in such a way as to threaten bodily harm to his neighbors may be indicted for maintaining a common nuisance. Local restrictions, either by state statute or municipal police regulation, generally require the licensing or registration of dogs, particularly in cities and districts where sheep-raising is carried on. Some local ordinances require that every animal of this kind shall wear a muzzle bearing the owner's address. In some states it is the law that a prosecution for theft of a dog cannot be maintained if its owner has not complied with the law in regard to taxes or license. Generally speaking, unless authorized by the state or city so to do, no person may without making himself liable to prosecution kill the dog of another unless he or some one under his lawful protection be in immediate danger of injury from the animal, or it be known to be rabid. Some states or cities have laws requiring the muzzling of dogs for a certain number of weeks in the year; others forbid the letting loose of an unmuzzled dog in the streets or public highways at any time. It is now the general custom for large cities to appoint and license regular dog catchers to seize any unmuzzled dogs and to take them to a place provided by the city, where they are held for redemption by their owner on paying a certain fine, in default of which redemption they are destroyed. The owner of a dog which has injured the person or property of another is liable for damages in a civil suit, the injury being in the nature of a tort; he cannot plead in mitigation of damages ignorance on his part of the vicious or destructive character of the animal. It has been held that the owner is bound to take every reasonable precaution, even if he has no special cause to suppose that his animal is viciously inclined; and the injured person will be awarded damages in such a civil suit as we have described unless it can be clearly shown by the evidence that he was himself in fault. As an example of this we may mention that it has been held that it is no defense in an action for damages against the owner of a dog that a person bitten by the animal had first accidentally injured it. Another decision of similar purport was in effect that where the owner of a dog knew that it had previously killed a sheep, and still retained it without taking special precautions against its going loose, he was liable for all subsequent injury done by the dog even to other animals than sheep, as, for instance, to a horse. Where statute or police provisions do not enforce muzzling or other restraint of dogs, still the courts may deal with the subject under the common law principles enunciated at the beginning of this article.

DOG BANE, *Apocynum*, a genus of plants of the natural order *apocynaceæ*, having bell-shaped flowers, no style, and the fruit a long linear follicle. Some of the species are shrubby, some herbaceous; some extend into colder climates than is usual for plants of this order. The D. of North America (*a. androsaë-mifolium*), a perennial herbaceous

plant, about 4 ft. high, with smooth stem, much milky juice, smooth ovate leaves, and whitish rose-colored flowers, growing in open barren places from Georgia to Canada, is valued for the medicinal properties of the bark of its root, which is emetic, diaphoretic, and in small doses tonic. The root of CANADIAN HEMP (*A. cannabinum*), a plant noticed on another account in the article *Apocynaceæ*, possesses similar properties.

DOG-DAYS, or **CANICULAR DAYS** (q.v.), are the twenty days immediately preceding, and the twenty days following, the rising of the dog-star Sirius. It falls at present between July 3 and Aug. 11. Ancient astronomers and astrologers named these days thus, attributing the great heat of summer and consequent disease entirely to the influence of the dog-star; but modern astronomers have proved the error of this reckoning, because, owing to precession (q.v.), the time is coming when Sirius will rise in the winter.

DOG DISTEMPER is a kind of violent catarrh, common among dogs, especially when young, producing running at the eyes and nose and a dry cough, followed by wasting of flesh and loss of strength, and sometimes by inflammation of the lungs and dysentery. The usual remedies are laxatives, emetics, and occasional bleeding. Astringents are useful in diarrhea, and fits may be modified by anodynes and warm baths.

DOGE (equivalent to *duke*) was the name of the chief magistrate, possessing princely rank, in the republics of Venice and Genoa. Dogate or dogado, both from the Latin *ducatus*, duchy, is used to indicate the dignity of doge. We find doges of Venice elected by the people, but enjoying almost the rights of absolute monarchs, as early as the beginning of the 8th century. Their power, however was considerably reduced towards the end of the 12th c., through the creation of a great council, composed of 470 members, chosen from nobles as well as citizens, and invested with legislative power. These afterwards appointed six of their own number to superintend the D. in the exercise of his executive power. Further, the *pregadi*, or nobles, who formerly were admitted by the D. to a share in the public affairs, were organized into a regular board of administration, numbering 60 members. By the new constitution, the people, too, lost the most essential of their rights—viz., the right of electing the doge. This right was now changed into a privilege belonging exclusively to the great council, whose members elected 24 from among themselves, and these latter again elected, by ballot, 12 of their own number, upon whom devolved the right of appointing a doge. Sebastiano Ziani was the first D. thus elected, 1177; and on the occasion of his elevation to office, he scattered money among the people, to console them for the loss of their rights—an act which was imitated by his successors, and soon became a recognized custom, as was also the case regarding the manner in which he went through the ceremony of wedding the Adriatic sea. The pope Alexander III., whom, during his quarrels with the emperor Frederic I., the D. had faithfully supported, sent him, together with other privileges, a ring, as the symbol of domination the republic had acquired over the Adriatic. Accordingly, a marriage ceremony took place on Ascension day—a ring being thrown from the ship *Bucentaur* into the sea, to show that as the wife is subject to her husband, so is the Adriatic sea to the republic of Venice. The practical bearing of the ceremony soon appeared in the shape of stringent measures, regulating the navigation of the Adriatic, and imposing tribute upon all foreign ships. The power of the D. underwent, in 1179, a signal modification; the Treble Quarantia—a high court of justice, composed originally of 40 members—having been erected, as also the board of *advogatori*, for the settlement of fiscal questions instituted. During the reign of Jacopo Tiepolo, 1229–49, a new restriction arose from the creation of an independent police, and a still greater one from the formation of a tribunal consisting of three inquisitors and five correctors, who, on the demise of a D., had to examine his conduct, sifting the minutest particulars of his private life. All these changes were effected by the great council, to the thorough exclusion of the people. In 1268, the great council, in order to cut short all family influence upon the affairs of the state, devised a curious and extremely complicated mode of election; but notwithstanding the limitations new and old, the power of a D. continued great, if he was only wise enough to profit by the contentions between nobles and citizens, the disputes of the different authorities, and especially by his own position as commander-in-chief of the forces and high-admiral of the navy. This last prerogative of the D. remained in vigor up to 1628, when, by a formal enactment, the D. was prohibited the exercise of such command, unless he were authorized by the council of forty. Other privileges, however, belonging originally to the dogate, were abrogated or circumscribed long before this, and especially during the period 1289–1311. Thus, at the instigation of the D., Gradenigo, who was actuated by jealousy towards the mighty family Tiepolo, the famous law of “closing the great council” was passed, and by it the whole legislative and judicial power made the heirloom of those families whose names were inscribed in the Golden Book, or *Libro d’Oro*. About that time (1309), ecclesiastics of any degree were declared unfit for political or judicial functions. To counterbalance the influence of discontented nobles, a public feast was instituted—to come off yearly—at which the D. gave a dinner to the fishermen, fraternizing with them in testimony of equality. Shortly before Gradenigo’s death, that terrible tribunal, the council of the ten, was erected, which was to be the highest in the state, irresponsible, and entitled to pass judgment upon the D. himself. In the meanwhile, the great council managed to get the functions,

public as well as private, of the D. circumscribed in the minutest way. It was ordered that the D. should not announce his accession, except to the princes of Italy; neither was he permitted the opening of dispatches emanating from the popes or from princes; the kissing of his hands, or kneeling down in his presence, was strictly interdicted. He could not leave town, be possessed of real property abroad, or allow his children to contract matrimonial connections with foreign houses, accept donations, etc. He had to submit to the continued presence of two *advogadori*, to be fined for the least mistake, and bear the expenses of the ducal dignity from his own purse. To all these restrictions and burdens the D. declared himself liable on the occasion of his coronation, by signing a document headed "Promissione." The state costume and retinue of the D. were minutely defined, and a trifle fixed as his salary. As a symbol of princely dignity, the D. wore a horned cap, and had the title of serenity. The credentials of ambassadors were written in his name, but signed by a secretary of state, and sealed with the arms of the republic. The money was struck in his name, but not with his stamp or arms. All the magistrates rose and saluted the D. when he came into council, and the D. rose to none but to foreign ambassadors. His family was exempt from the jurisdiction of the master of the ceremonies; and his children, though excluded from public offices, were allowed to have staff-officers, and gondoliers in livery. After the death of And. Dandolo, 1254, on a motion from the correctors, the three presidents of the *quarantia*, and later six ministers, were joined to the six privy-councillors of the D., who, together with the above-named, has formed henceforward the so-called Signoria Serenissima. At that stage the rank of D. could no longer be an object of ambition, and as early as 1339, a law was necessary to prohibit the D. elected from resigning his place. And. Contarini, 1367, accepted the proffered dignity only upon the threat of being declared a traitor to the country. In 1413, by a law emanating from the great council, the D. was even denied the title of Signoria, that of Messere being substituted instead; at the same time he was deprived of the right of convening an *arengo*, or meeting of the people. With the fall of the Venetian republic, 1797, the dignity of D. also disappeared. There were in all 73 D. at Venice, the first of whom, Anafeste (Paoluccio) was elected 697; the last, Manin (Lodovico), 1788. In the Palazzo Ducale, the celebrated frieze of the D. is to be seen round the Sala del Maggior Consiglio, exhibiting 72 portraits, and one space covered with a black veil, with an inscription, indicating that Faliero (Marino) was beheaded for high treason.

The republic of Genoa elected, after a victory gained by the party of the people (1339), Simon Boccanera for its first doge. He was elected for life, and with absolute power, of which, however, he allowed a share to 12 aldermen (*anziani*), the one half being chosen from the *cittadini* (citizens), the other among the *nobili* (nobles). In the long run of centuries, the power, duration, and splendor of the ducal seat underwent frequent changes, arising from the vicissitudes of the state and the hostilities between the popular and aristocratic parties. A constitution for defining the functions and prerogatives of the D. was framed in 1528, after the great victory of And. Doria over the French. According to this constitution, which, with slight modifications, remained till the end of the republic, the dignity of D. was of two years' duration, under restrictions similar to those at Venice. The candidate was to be a noble, and at least 50 years of age. The D. presided, with the right of veto, in the sittings of the great council, composed of 300 members, as also in those of a smaller one, consisting of 100. These two councils exercised the legislative power, whereas the executive was vested in the D., together with 12 *governadori* and eight *procuratori*, among these latter being always the D. retiring. During the time of his government, the D. resided in the state palace, where he was liable to the same restrictions and ceremonies which were in use at Venice. When, in 1797, Genoa was occupied by the French, the dogate ceased to exist; in 1802, the Genoese republic being, conjointly with the Ligurian, re-established, the ducal dignity was once more resuscitated; but in 1804, it disappeared forever, the republic itself having been dissolved.

DOGFISH, the popular name of some of the smaller species of shark; apparently owing its origin—like the names porbeagle, hound, etc., bestowed on others of the same family—to their habit of following their prey like dogs hunting in packs. Of the species to which the name D. is given on American coasts, one of the most abundant is that sometimes called the common D. (*acanthias vulgaris*), also known as the piked (i.e., piked or spined) dogfish. It belongs to the family *spinacidae*, of which one characteristic is the presence of a spine before each of the two dorsal fins; and which is further characterized by having spiracles or spout-holes; by having five gill-openings on each side all before the pectoral fins; and by having no anal fin, and no nictitating membrane of the eye. The body is long and tapering; the head flat; the snout conical; the teeth in both jaws sharp-edged, and formed for cutting. The tail-fin is longer than it is broad. The upper parts are slate-gray, the under parts yellowish-white; the skin very rough when rubbed from tail to head, but seeming quite smooth when rubbed in the contrary direction. This fish uses its spines in a remarkable manner, bending itself into the form of a bow, and unbending with a powerful spring; and "if a finger be placed on its head, it will strike it without piercing its own skin." It attains a length of 3 or 4 feet. It is very widely distributed, being found in the Atlantic, the Mediterranean, and

the South seas. It causes great annoyance to fishermen, by cutting the hooks from their lines, and still more by frightening away the shoals of herring, in which other kinds of D. share the blame with it. It sometimes appears in prodigious numbers; 20,000 have been taken in a net at one time on the coast of Cornwall; and the fishermen of the Orkneys and Hebrides sometimes load their boats to the water's edge with them. The flesh, although coarse, is dried and eaten; the livers yield oil, and the refuse parts are used as manure.—The other British dog-fishes belong to the genus *scyllium*, of the family *scylliidae*, which have an anal fin, and two dorsal fins placed far back. They resemble in general form the species just described, and like it, they have the tail-fin longer than it is broad—they have five gill-openings on each side—the last of which, however, is over the base of the pectoral fin. They have spout-holes, and no nictitating membrane; but their teeth are very different, having a long central point, with shorter points on each side. The spotted D. of two species (*S. canicula* and *S. catulus*), both of a generally reddish-brown color, and marked with dark spots, is often taken with bait on all parts of the British coasts; and although almost never brought to market, is much used for food in the Orkney islands. It has been suggested that the fins of these and other sharks might be used for making gelatine soup, as in China.

DOG-FOX, a name sometimes given to certain small animals of the family *canidae*, allied to the *corsac* (q.v.), and, like it, referred to the genus *cynalopex*. They have a sharp muzzle, not unlike that of a greyhound, rather large, erect, pointed ears, the pupil of the eye contracting circularly as in the dog, the tail bushy like that of a fox. They inhabit warm parts of Asia and Africa; and some, if not all of them, burrow.

DOGGER is a vessel something like a galliot or a ketch, used by the Dutch as a fishing-boat in the German ocean. It is not certain whether these were named after the Dogger-bank, or *vice versa*.

DOGGERBANK, an extensive flat sand-bank in the middle of the German ocean, between England and Denmark, in lat. 54° 10' to 55° 30' n., and long. 1° to 5° east. It stretches 320 m. e.n.e., from 12 leagues e. of Flamborough head to within 20 leagues of Jutland. A prolongation runs e. towards Horn Point, Denmark. The bank is in some parts 60 m. broad, but the average breadth is 40. Towards the English coast, it is only 9 fathoms deep, in some parts it is 30, but the average depth is 15 to 20. The surrounding sea is in many parts 24 to 60 fathoms deep. The surface of the bank consists chiefly of fine sand and ooze. It is the seat of important English and Dutch cod-fisheries. At the s. end of D., in 1781, occurred the indecisive naval fight between the Dutch and English fleets, under admirals Zoutman and Parker respectively.

DOGGET'S COAT AND BADGE. These form a prize at a rowing-match on the Thames every year on the 1st of Aug. The prize is a bequest of Thomas Dogget, an actor of Drury Lane theater, who desired to signalize the accession of George I. to the throne (Aug. 1, 1715) by a prize of a waterman's coat and badge. Such is the account usually given; it would appear, however, from the following notice in the *Times* newspaper (Aug. 2, 1861), that there are several prizes rowed for on this occasion. "The first prize is a livery and badge given by Mr. Thomas Dogget, deceased, to which the Fishmongers' company add a guinea. The second and third prizes are respectively five eighths and three eighths of the interest on £260 17s. 3d., formerly £200 South-Sea stock, left in the will of sir William Jolliffe, the amounts respectively being £4 17s. 9d. and £2 18s. 9d. The prize for the fourth man is £1 11s. 6d., and for the fifth and sixth men each £1 1s., the last three given by the company." Besides these prizes, additional sums are occasionally given by private individuals to the winner, or to the first, second, and third in the race. The competition is by six young watermen whose apprenticeships have expired the previous year; each being in a boat by himself, with short oars or sculls. The barge-master of the Fishmongers' company is ordinarily the umpire. The competition takes place when the current of the Thames, by recession of the tide, is strongest against the rowers; and the race, which is from London bridge to the Old Swan at Chelsea, always excites much local interest.

DOG-GRASS. See **COUCH GRASS**.

DOGLIA'NI, a t. of Piedmont, northern Italy, is situated in a mountainous district on the left bank of the Rea, 12 m. n.e. of Mondovì. D. has the remains of an old castle, but no other buildings worthy of note. Here five annual fairs are held, at which cattle, hemp, and victuals are chiefly sold. Pop. 5,000.

DOGMA (Gr.), meant originally an opinion or proposition, put in the form of a positive assertion, its truth being supposed to have been previously shown. In theology, it was understood to signify a doctrine founded on Scripture, and advanced not for discussion but for belief. But as this method of stating truth easily degenerates into the assertion of opinions without ground, and without regard to the aspect they may present to others, *dogma* and *dogmatism* have come in English to be almost synonymous with assertion without proof.

In continental theology, however, the word is still used without implying any censure, dogmas (Ger. *dogmen*) meaning simply doctrines; and this is the case in our own expression, dogmatic theology, or dogmatic, which is that branch of theology that treats

of the systematic arrangement of the doctrines of Christianity. Older names for the same thing were *Loci Theologici* and *Theologia Positiva*.—The first attempt to give a connected view of Christian doctrine was made in the 3d c. by Origen in his work *De Principiis*. He was followed in the 4th c. by Augustine, who in his book *De Doctrina Christiana*, and others, treated of the whole body of doctrine held by the church, though without any very scientific arrangement. The contributions to dogmatic, made in the 5th, 6th, and 7th centuries, were mere collections of "sentences." In the east, in the 8th c., the doctrines of the Greek church were treated by John of Damascus in a form already Aristotelian, and his work may be considered the first systematically-arranged treatise on dogmatic. He makes no mention of purgatory. His book was as influential in the Greek church as the writings of Augustine in the Latin. The regular systematizing of doctrines began with the SCHOLASTICS in the 11th c., but degenerated often into hair-splitting. The first cultivators of dogmatic theology among the Scholastics were Hildebert of Tours and Abelard, who were followed by Petrus Lombardus, Alexander de Hales, Thomas Aquinas, Duns Scotus, etc.

The era of the reformation awoke dogmatic to a new life, leading it back from Aristotle to Biblical theology. But the controversies between the different churches in the 17th c., and the too great importance attached to confessions of faith, cramped anew its freedom, and gave it again a Scholastic turn. Many of our still standard treatises on systematic divinity wear traces of these fetters, and contrast strikingly with the independence and vigor of inquiry displayed in the similar works of Melancthon, Calvin, and other reformers. A fresh revival followed in Germany the spread of the critical philosophy of Kant, when Biblical theology rose up in contradistinction to the theology of confessions, and dogmatic was grounded on the critical interpretation of Scripture rather than on traditional formulas. Hence, however, have sprung widely diverging views. One party still held fast by the existing confessions; another looked chiefly to the contents of Scripture; while a third subjected confessions and Scripture alike to the test of reason. Besides these, there arose in more recent times, a school of dogmatic theologians, formed on the philosophical systems of Jacobi and Schelling, who looked for the essence of religion in the human soul itself, and considered Christianity as the historical revelation of it. Of this school, Schleiermacher, and in some respects Neander and Rothe also, may be considered the representatives; and of all the German schools, it is that which seems to be exercising the greatest influence on the speculative theology of Britain. An important contribution to this department of theology was Peter Lange's *Philosophische Dogmatik* (2 vols., Heidelb. 1849-51). The dogmatic of D. F. Strauss is constructed from the Hegelian point of view, and in its leading results comes back to the system of Spinoza.

It deserves remark that Christian dogmatic and morality, which it had been the custom to discuss separately since the 17th c., have recently been treated in combination by Nitsch and Beck. The scientific investigation of Christian doctrine in Germany has not been confined to the Protestant churches. A number of Catholic theologians have occupied themselves with this branch of sacred science; some, as G. Hermes of Bonn, inclining to freedom of investigation, and others, as Liebermann, to the defense of the usual formulas.

THE HISTORY OF DOGMAS OR DOCTRINES has been raised in Germany to the rank of a distinct branch of sacred science. In this country, the facts with which it deals have received only passing notice in treatises on systematic theology, and in ecclesiastical history have been considered as the "internal history of the church." The pursuit of this branch of inquiry is characteristic of Protestantism; in the Catholic church it is considered as endangering the unity of the faith. Many Protestants even dislike the idea of a "development" of Christian doctrine, which seems to be involved in its having a history. It is not necessary, however, to believe that doctrines hitherto absolutely unknown or denied, came from time to time to be embodied in the orthodox creed of Christendom. See DEVELOPMENT OF DOCTRINE. Though this may be denied, it remains an indisputable fact that the several doctrines came one after the other into prominence in the consciousness of the church; and that in each period of her history there is some one leading doctrine which assumed an importance, as if it were the mainstay of Christianity. To depict this succession or evolution of views with their struggles and modifications, and trace the different ways in which the several doctrines were at different periods formulated and embodied in the creeds, is the object of a history of doctrines (Ger. *Dogmengeschichte*). There is, of course, room for great variety in the method of treating such a subject. Among the most important works on this subject is Neander's, edited by J. L. Jacobi, 1856 (English trans. 1858), and that of F. C. Baur (1847), whose name marks an era in this branch of study.

DOGS, ISLE OF, or *Poplar Marshes*, a small peninsula in the co. of Middlesex, England, formed by a circuitous winding of the Thames, is situated in the vicinity of London, distant $3\frac{1}{2}$ m. e.s.e. from St. Paul's cathedral. It is about a mile long, and three-quarters of a mile broad. In what may be called the isthmus of the peninsula are situated the West India docks. It is said that the Isle of Dogs derives its name from the circumstance that the king's hounds were formerly kept here.

DOGS. See ANDIRON.

DOG-SHORE. See **LAUNCH.**

DOG'S-TAIL GRASS, *Cynosurus*, a genus of grasses having a pretty close spike or ear, each spikelet with two equal glumes and 3 to 5 florets, and beneath each spikelet a comb-like bract or involucre. The species, which are not very numerous, are chiefly natives of Europe and Asia. Two are found in Britain, but one only is common and valuable, the **CRESTED D. G.** (*C. cristatus*), which forms an important part of almost all good pastures, and is particularly esteemed for sheep pastures and lawns, for the improvement of which it is often sown. Its herbage is fine and close, and its deep roots secure it against droughts, which cause many other grasses to wither; but the herbage is not sufficient in quantity to make it desirable for hay. The comb-shaped bract connected with each spikelet of this common grass is a very interesting and beautiful object. The seeds are small, shining and yellow, whence the name gold-seed sometimes given to this grass by farmers.

DOG-STAR. See **SIRIUS.**

DOG-WATCH. On shipboard there are two, usually from 4 to 6, and from 6 to 8 P. M.

DOGWOOD, or **DOGBERRY**, the name usually given to some of the arboreous and shrubby species of the genus *cornus*. See **CORNEL**. The common D. of Europe (*C. sanguinea*), a native of Britain and many parts of the continent, and also of the n. of Africa, is a shrub of 4 to 15 ft. in height, with ovate leaves, and terminal cymes of greenish-white flowers, which have an unpleasant odor. The leaves become of an intense dark-red color before they drop off in autumn. The wood makes the very best charcoal for gunpowder. It is very hard, and is made into skewers for butchers and cooks, and into cogs for wheels. The young wood was, in former times, in request for the making of arrows. The fruit, which is small, dark purple, and very bitter, yields an oil said to be equal to that of the olive, and to the amount of 34 per cent of its weight. This oil is used in France for lamps, and for the manufacture of soap. The D. of North America (*C. florida*) is a small tree, found in the United States, from lat. 43° to Florida, with oval leaves, and small yellowish flowers, which are surrounded by large white roundish bracts. The berries are red, and remain on the tree most of the winter. The flowers appear before the leaves, and their large white bracts are amongst the ornaments of the American woods in spring. The tree attains a height of 20 to 30 ft., with a trunk 8 or 10 in. in diameter. The wood is white, hard, fine-grained, much esteemed and used for inlaying and ornamental work. The bark is very successfully employed in the cure of intermittent fevers. It is also a valuable tonic. It is one of the most valuable medicinal products of North America. The barks of several other North American species of *cornus* possess similar properties. **JAMAICA D.** is *piscidia erythrina*, of the natural order *leguminosæ*, suborder *papilionaceæ*, a good timber-tree, with hard and resinous wood, which lasts well either in or out of water; the bark of the root powerfully narcotic, used for stupefying fish, and also for relieving toothache, being applied to the tooth in the form of a saturated tincture, or taken into the stomach as a powerful sudorific.

DOILEY, or **DOILY**, a small napkin used at table for putting glasses upon during dessert. Some are highly ornamented. The name is said to be derived from the original maker; but more probably it is a modification of the Dutch *doeale*, a towel, and was introduced along with the article from Holland.

DOIT, a small copper coin current in Scotland during the reigns of the Stuarts. It was a Dutch coin (*duit*), and in value the 160th part of a guilder, which, estimated at forty cents, would make the D. equal to the eighth of an English penny, or half a farthing. By some authorities it is said to have been worth only the twelfth of a penny; in reality, it is difficult to say what was its worth, for being imported, like many other coins of the period, from Holland, it would rise and fall in value according to the scarcity of money. The D. must have been common in the early part of the reign of James VI. The kirk-session of Perth (16th April, 1582) "ordains James Sym to give the witch in the telbooth 8 doits in the day" for subsistence.

DOKKUM, a t. in the Netherlands, province of Friesland, lies 12 m. n.e. from Leeuwarden, on the Ee (pronounced *Ay*), which cuts it into two irregular parts. Within the town is a broad haven, suited both for sea-going and inland ships. There are several regularly built streets and many neat houses. The trade in flax, cattle, wool, and chickory is extensive. In the Dokkummerdiep, shrimps are largely taken. Ship-building, gin-distilling, beer-brewing, carding wool, etc., are principal industries. There are a grammar and other good schools. Pop. about 5000.

DO'KOS, a race of blacks in Africa, s. of Abyssinia, almost dwarfs in size. They are in a wild state, and are the favorite prey of slave-stealers.

DOLABELLA, **PUBLIUS CORNELIUS**, b. about 70 B.C.; a Roman gen. of violent and wicked character, often involved in criminal acts, from which he was extricated by Cicero. When 30 years old he drove away his wife Fabia, and married Tullia, Cicero's daughter, against the father's consent. Being heavily in debt he fled from Rome to Cæsar's camp, and took part in the battle of Pharsalus. Returning to Rome, he gained immunity from his debts by securing for himself an election as tribune, and his first legislative act was to propose a law canceling all debts. He was so troublesome in Rome that, to remove him, Cæsar made him a gen. in Africa. Dolabella was ambi-

tious to be consul, and Cæsar promised him the office; but Antony's opposition delayed the fulfillment, and before it could be arranged, Cæsar was murdered. Dolabella at once seized the insignia of office, made friends with the assassins, and was confirmed in the office which he had usurped. He threw down an altar erected to Cæsar, and crucified those who would offer sacrifices upon it. Antony sent him in command of an expedition against the Parthians, where his cruelty and rapacity added infamy to a name already infamous. He tortured Trebonius at Smyrna for two days to force him to disclose the hiding-place of his treasures, and then murdered him. Hearing of this, the senate outlawed Dolabella, and sent Cassius to take his place. Having no further hope of power, Dolabella caused one of his own soldiers to kill him, 43 B.C.

DOLABRA, a rude ancient hatchet. They are represented on the columns of Trajan and Antoninus, and abound in all museums. When made of flint, which was their earliest and rudest form, they are usually called *celts* (q.v.).

DOLCE, an Italian term in music, meaning softly and with tenderness.

DOLCE, LUDOVICO, or LUIGI, 1508-68; an Italian author and a voluminous writer. He translated almost anything and everything from the Greek and Latin, and wrote original works, in all 70 in number. The best known is *Marianna*, a tragedy from the life of Herod, reproduced in French by Voltaire, and still on the stage. He also wrote the lives of Charles V. and Ferdinand I., other dramas, and miscellaneous works.

DOLCI, CARLO, or CARLINO, a celebrated painter of the Florentine school, was b. at Florence in 1616. He received his first instructions in art from Jacopo Vignali, a pupil of Roselli, and a remarkably skillful teacher. After an uneventful life spent entirely in his native city, D. died Jan. 17, 1686. His works, which consist chiefly of madonnas and saints, exhibit the character attributed to him. The faces are full of a pleasing and tender softness, which, however, is often carried so far as to rob them of all character. D.'s drawing is generally correct, his coloring exquisitely delicate and transparent, and in the nicety and laborious care of his finish he approaches the most characteristic examples of the Dutch school. His works are numerous, and scattered over all Europe. Besides his madonnas, the most famous are his "St. Cecilia," "Christ Blessing the Bread and Wine," "Herodias with the Head of John the Baptist," and "Christ on the Mount of Olives." See *illus.*, CORREGGIO, ETC., vol. IV.

DOLCINITES, or DULCINISTS, a sect established in Italy in the 13th c.; they were opposed to the popes, and their doctrines were similar in many respects to those of the spiritual Franciscans. In 1307, Dolcino, the founder of the sect, with some of his followers, was burned at the stake.

DOLDRUMS, a sailor's name for the part of the ocean near the equator, characterized by calms, squalls, and light baffling winds, by which ships are often prevented for weeks from making any real progress. See **WIND**. The name in this application has given rise to the phrase *to be in the doldrums*; i.e., to be dull, listless, or bored.

DÔLE, a well-built t. of France, in the department of Jura, 28 m. s.e. of Dijon. It is delightfully situated on a vineyard slope rising from the right bank of the river Doubs, and the environs are tastefully laid out in gardens and promenades. The principal building is an immense cathedral, named, in honor of the Virgin, *Nôtre Dame*. The chief manufactures of D. are hosiery, tiles, pottery, chemical products, and beer; there are also iron-smelting furnaces, flour-mills, and some trade in corn, wine, wood, marble, and iron. Pop. '91, (commune) 14,253.

DOLE, NATHAN HASKELL, b. Chelsea, Mass., 1852; graduated at Harvard coll., 1874; has translated, edited, and enlarged Rambaud's *Histoire de Russie*, and published an original *Young Folks' History of Russia*, and many translations and works on Russian literature, besides *Not Angels Quite*, *The Hawthorne Tree*, *Rubaiyat of Omar Khayyam* (1896), etc.

DOLE, SANFORD BALLARD, jurist; b. of American parents in Honolulu, Hawaii, in 1844; educated in the United States and Honolulu; admitted to the bar in Boston, Mass.; judge of the Supreme court of Hawaii in 1887-93; became president of the provisional government on the overthrow of the kingdom in 1893, and president of the federal republic established in 1894.

DOLES AT FUNERALS; these are of great antiquity. St. Chrysostom speaks of them as being given to procure rest to the soul of the deceased. On this ground, as well as on the score of general benevolence, the practice of making gifts to the poor at funerals was common until comparatively recent times; for it was continued, sometimes on a munificent scale, long after the custom of praying for the dead had been abandoned on the introduction of reformed doctrines. Nichols, in his *History of Leicestershire*, speaking of Strathern in Framland Hundred, observes of this usage: "In 1790, there were 432 inhabitants, the number taken by the last person who carried about bread, which was given for *dole* at a funeral; a custom formerly common throughout this part of England, though now fallen much into disuse. The practice was sometimes to bequeath it by will; but, whether so specified or not, the ceremony was seldom omitted. On such occasions, a small loaf was sent to every person, without any distinction of age or circumstances, and not to receive it was a mark of particular disrespect." These doles, whether in money or in articles of food and ale, were at one time common not only in England, but in Wales, Ireland, and Scotland; and the custom may be said to have represented, in a simple state of society, that form of benevolence which, in the present

day, consists of bequests to hospitals and other public charities. By some writers, the custom of making doles at funerals is traced to the sin-offering of the Hebrews. See Brand's *Popular Antiquities*, edited by Ellis.

DOLET, ÉTIENNE, 1509-46; a French writer and printer, said to have been an illegitimate son of Francis I. In 1537, he obtained a privilege for ten years to print any works of his own or which had received his supervision. His liberality of sentiment was manifest from his press issues, which ranged from the New Testament in Latin to Rabelais in French. This liberality brought upon him the persecution of the Roman Catholic church, and after long watching he was arrested as a relapsed atheist, put to the torture, and burnt to death; the alleged cause being his insertion in Plato's *Arctichus* of the words "Nothing at all," implying a denial of the immortality of the soul; and yet Plato's book more exactly and positively makes that denial. Dolet was an earnest advocate for the circulation of the Scriptures in the common language of the people.

DOLGELLEY ("dale of hazels"), the capital of Merioneth, North Wales, near the center of the co., and the largest town in it, is situated on the banks of the Wnion, 208 m. n.w. by w. of London. It lies in a rich and picturesque valley, at the foot of Cader Idris, and during the summer months is much frequented by English and foreign tourists. It has manufactures of coarse woolens and flannels. Pop. (1891) 2467.

DOLGORUKY, KATHARINA, PRINCESS, the favorite of the Russian czar, Alexander II., who contracted a morganatic marriage with her in July, 1880, after the death of his wife. After the assassination of the czar she removed to Switzerland, and in 1882 published at Geneva, under the pen-name of Victor Laferté, *Alexandre II., Détails inédites sur sa vie intime et sa mort*.

DOLICHOS, a genus of plants of the natural order *leguminosæ*, sub-order *papilionaceæ*, closely allied to *phaseolus* (see KIDNEY BEAN), and chiefly distinguished by the extension of the base of the standard so as to embrace the wings of the corolla at their base. The genus includes a considerable number of species, some of them shrubby, some annual, and some perennial herbaceous plants. Some of them have beautiful flowers, and some of the herbaceous species are cultivated on account of their seeds, which afford a kind of pulse; or of their young pods, which, like those of the kidney bean, are boiled for the table. Among these are *D. lablab*, a native of India and Egypt (which has been made the type of a separate genus, *lablab*); *D. Nankinicus* (or *lablab Nankinicus*) a Chinese species; *D. lubia*, a native of Egypt; *D. sesquipedalis*, a native of America; *D. soja* or *soja hispida* (the soy bean), *D. catieng*, and *D. uniflorus* (horse gram), natives of India; *D. sphaerospermus* (calavana or black-eyed pea), a native of the West Indies. In the climate of Britain, even the most hardy kinds require the aid of a little artificial heat, and they are reckoned inferior to other kinds of pulse or garden vegetables of easier cultivation. The well-known Chinese sauce or ketchup called soy (q.v.) is made from the soy bean. Allied to *D.* is the genus *canavalia*, to which belong the SWORD BEANS of India. *C. gladiata*, the commonly cultivated species, has pods 2 ft. long. Another allied genus is *psophocarpus*. The seeds of *p. tetragonolobus*, formerly *D. tetragonolobus*, are used in the Mauritius as peas are in America; and its pods and tuberous roots are common Indian esculents. Some species of *pachyrhizus*, also an allied genus, are remarkable for their tuberous roots, as *p. angulatus* (formerly *D. bulbosus*), a native of India, now cultivated in South America and other warm countries, which produces pleasant turnip-like tubers; and *P. trilobus*, which has tubers 2 ft. long and nearly cylindrical, much used as a boiled vegetable in China and Cochin-China.

DOLICOCEPHALIC, long-headed; a designation of human skulls which have the diameter from front to back much greater than the transverse diameter. Such are the heads of certain Australian and West African races. The opposite conformation is called *brachycephalic*, or short-headed.

DOLINA, a t. of Austrian Galicia, in the circle of Stryi, 60 m. s. from Stryi, on an affluent of the Swica. It has extensive salt-mines. Population of town estimated at 4000.

DOLIUM, a genus of gastropod mollusks having shells spirally furrowed, resembling the hoops on a cask. More than a dozen species are found in the warm seas of the east, and seven fossils are known.

DOLL, an imitative baby used as a toy by girls. The word doll is of doubtful derivation; possibly from *idol*; in French, the name is *poupée*; in German, *puppe*, from Lat. *pupa*, a girl, a doll. The use of dolls dates from the most remote times, and is common in all countries, barbarous as well as civilized, because it springs from that love of nursing and fondling infants which is implanted by nature in the female character. Precisely as a child in a princely mansion in England fondles a finely dressed doll worth a guinea, so does the child of an African or Esquimaux take delight in a piece of wood or bone carved rudely in the form of a baby—in fact, girls in the humbler ranks may sometimes be seen hugging and talking to a bit of stick decorated with a few rags, as if it were a live child. This is not the place to discuss this curious psychological phenomenon; it is enough to say that the love of dolls is a perfectly legitimate feeling, and its exercise helps to cultivate not only tender affections, but taste as regards the making and management of children's dresses. Accordingly, the keeping of a doll becomes a

part of the home education of girls; and is recognized to be so by the universality of the practice.

As in the case of most other toys, dolls were at one time imported into Great Britain chiefly from the Netherlands; and hence not an unusual name for a doll was a Flanders baby. These old Flemish or Dutch dolls were made of wood, with neatly formed faces and flashy dresses, the cheaper kinds having slender wooden legs. Latterly, there have been great improvements in the making of dolls, and in England it has assumed the character of a manufacture; but there are still large importations from the countries on the Rhine, France, and Switzerland. In these continental countries, women and children are mostly engaged in the manufacture. Some carve the heads and bodies, others paint the faces and necks, others prepare legs and arms, and a different class cut out, sew, and put on the dresses. These operations are seldom executed in one manufactory. Usually, dealers buy the fragments so far prepared by villagers, and get them put together in a wholesale way. As the time employed in the preparatory processes is scarcely of any marketable value, the prices of fragments are most insignificant. Hence, as regards all the cheap kinds, with painted faces and ringlets, dolls can be imported at a cost below that at which they could be executed by hand-labor in England. When, however, we come to dolls of a superior kind, with molded wax or composition faces, arms and feet, glass eyes, stuffed bodies, flaxen ringlets, and gauze dresses, the English, by their machinery and capital, carry off the trade. In London there is a considerable number of doll-makers, manufacturing dolls of wax, gutta-percha, india-rubber, etc. In this as in other trades, there is an economic division of labor; there are dolls' head-makers, dolls' leg and arm makers, doll sewers, doll stuffers, dolls' wig-makers, dolls' eye-makers, and doll dressers. For some dresses, remnants of calico, gauze, silk, and other materials, are procured from shops; but for fashionably dressed dolls, much in demand, it is necessary to buy goods on a large scale. The extent to which dolls' glass-eyes are manufactured appears surprising. Some years ago, in evidence before a committee of the house of commons, a glass-manufacturer at Birmingham stated that he had received, at one time, an order for £500 worth of dolls' eyes. The cheaper dolls' eyes are simply small hollow glass-beads, made of white enamel, and colored with black or blue, but without any attempt at variety or effect; while those eyes of a higher quality have a ring of color to represent the iris. The introduction of wires and mechanism to make the eyes move or wink at pleasure, and also to cause the doll to utter the sounds "papa" and "mamma," have been highly appreciated steps in advance, with a corresponding rise in prices. It is stated in the experience of the trade, that since Victoria came to the throne, blue eyes for dolls have been in the ascendant in England; but that black eyes find the best market on the continent, especially for Spanish dolls. Black dolls are made for export to America, where they are in request by girls of negro parentage, and the introduction of gutta-percha is favorable for this branch of the trade. Composition-heads are usually made of *papier mâché*, cast in a mold, and waxed and painted to represent the features.

One of the most attractive stalls at the great exhibition in 1851, was that which contained the dolls of Mme. Montanari, a London manufacturer. Referring to this stall, the jury report said: "It consists of a series of dolls, representing all ages, from infancy to womanhood, arranged in several family groups, with suitable and elegant model furniture. These dolls have the hair, eyelashes, and eyelids separately inserted in the wax, and are, in other respects, modeled with life-like truthfulness." Dolls of the ordinary kinds are manufactured in New York and in some New England cities, but a large proportion of those sold in the United States are imported from Germany, where the principal seat of manufacture is Sonneburg in Thuringia, a town in which doll-making employs a majority of the inhabitants. The "talking-dolls," invented by Edison, in which the phonograph is ingeniously employed, are the latest advance in this branch of manufacture.

DOLLAR is the name of a coin, and the unit in the monetary system of the United States. The origin of the name deserves notice. *Dollar* is a variety of the Ger. *thaler*, Low Ger. *dahler*, Dan. *daler*; and the word came to signify a coin thus: About the end of the 15th c., the counts of Schlick coined the silver extracted from their mines at Joachims-thal (Joachim's valley) into ounce-pieces, which received the name of Joachims-thaler—the Ger. adjective from the name of the place ("Joachims-dalers," as it were). These coins became a kind of pattern and similar coins made in other places took the name dollar. The American dollar is taken from the old Spanish dollar or piastre, and is only slightly less. It was formerly only of silver; but in 1873 the gold dollar was made the unit of value in the United States and the coinage of the silver dollar was prohibited. It was resumed again in 1878 under the Bland-Allison bill. Since 1837, the silver dollar is required to contain 412½ troy grains, the fineness of which is fixed at $\frac{9}{10}$, i. e., $\frac{1}{10}$ of it is alloy. The average bullion value of the silver dollar in 1873 was \$1.004, but since then it has steadily decreased, by reason of the fall in the price of silver, to 52.8 cents during the first 6 months of 1896. The United States gold dollar weighs 25.8 grains or 1.672 grammes and is generally estimated in exchange with Gt. Britain at 4s. 2d. sterling. There have also been coined in silver, *half-dollars*, *quarter-dollars*, *dimes* ($\frac{1}{10}$ dol.), *half-dimes* ($\frac{1}{20}$ dol.), and three-cent pieces. The two latter denominations have not been coined for a number of years. With regard to these, it was enacted in 1853, that the weight of the half-dollar shall be 192 grains, and that of the

others proportional to this; and that such silver coins shall be legal tenders for all sums not exceeding five dollars. The standard gold of the United States is of the same fineness as the silver—namely, $\frac{9}{10}$; and of this are coined double-eagles, eagles, half-eagles, and quarter-eagles, of 20, 10, 5, and $2\frac{1}{2}$ dollars, besides one-dollar pieces. The dollar or thaler in Germany had various values. That of Prussia, which is most current, is equivalent to seventy-five cents. See MONEY.

DOLLAR, a village in Clackmannanshire, on the right bank of the Devon, 10 m. e.n.e. of Stirling. It lies in a plain under the Ochills (q. v.). D. is noted for its academy, founded in 1818 under the will of capt. M'Nab, a native of the parish, who bequeathed £80,000 for the purpose. The academy was incorporated by act of parliament in 1847. The minister and kirk-session of D. were the original patrons and governors, but in 1847 the trust was extended so as to include the lord-lieutenant, vice-lieutenant, convener, and sheriff of the county, the principal of the university of Edinburgh, county gentlemen, two members of the presbytery of Stirling, and two representatives appointed by the parliamentary electors of Dollar. Pop. '91, 2000. Coal mines are worked near by, and lead and copper were formerly mined in the Ochills. A mile n. of D. are the fine ruins of castle Campbell, in a wild romantic situation, on the top of a high almost insulated rock, in a hollow in the bosom of the Ochills, amid mountain rivulets and bosky woods. It long belonged to the Argyle family. John Knox is said to have resided in the castle under the protection of Archibald, fourth earl of Argyle, the first Scotch noble to embrace Protestantism publicly.

DOLLART, TIFE, a gulf of the German ocean, at the mouth of the river Ems, between Hanover and Holland. It is about 10 m. in length by 7 in breadth, and was formed by inundations of the sea, the first of which took place in the latter half of the 13th c., and the last in the 16th century. By these watery inroads a large number of villages were submerged, and thousands of persons perished.

DÖLLINGER, JOHN JOSEPH IGNATIUS VON, one of the most distinguished of Roman Catholic divines of modern Germany, was b. at Bamberg, Feb. 28, 1799. He was educated at Würzburg, where he received holy orders. For a time he was engaged in parochial duties in his native diocese; but having manifested a peculiar fitness for a literary life, he was appointed a professor at Aschaffenburg, whence, in 1826, he was removed to the chair of ecclesiastical history in the newly established university of Munich. From the first he was distinguished as a ready and profound writer. He inaugurated his new professorial career by a work on *The Doctrine of the Eucharist during the First Three Centuries*, in 1826, and a *History of the Reformation*, being a continuation of Hertig's *Handbook of Church History*. He subsequently undertook a new *History of the Church* (vol. i. 1833, vol. ii. 1835), which was speedily translated into French, and also into English, and was carried down to the 15th c.; with a compendium which came down to the reformation (1836-43). His very learned and suggestive essay on *The History, Character, and Influence of Islamism* appeared in 1838, and *The Reformation, its Internal Development and Effects*, in 3 vols., in 1846-48. The design of this work, which consists almost entirely of extracts (connected by a very slight thread of narrative) from the writings of the leading reformers and other contemporary Protestant divines, is to present in the words of the actors in the great religious drama of the 16th c., a picture, doctrinal, moral, social, and political, of the reformation and its results; but as the great body of the authorities (exclusively Protestant) are German, the interest of the work is mainly national.

For a time, D. undertook the chair of dogmatic theology, in which capacity he delivered lectures on "The philosophy of Religion," on "Symbolism," and on "Patristic Literature," none of which, however, have been published. He was a frequent contributor to the *Historisch-politische Blätter*; he published several pamphlets on subjects of occasional interest; and was one of the chief contributors to the Catholic cyclopædia, entitled *Kirchen-Lexicon*, in which his articles on Luther, on Bossuet, and on Duns Scotus attracted much attention. In the politico-religious movement of 1846-47, D. was elected to represent the university of Munich in the Bavarian chamber; but being deprived of his professorship, he became disqualified to sit in the chamber. In the parliament of Frankfurt, in 1848, he was recognized as the leader of the Catholic party. Most of the measures of importance bearing on the relations of church and state which (however ineffectively) were originated in that assembly were prepared or suggested by him. In 1849, he was restored to his professorship at Munich, and also to his place in the Bavarian chamber, which he held till 1852. After that year, he devoted himself entirely to theological literature. His work entitled *Hippolytus und Kallistus* (1853) is a masterpiece of patristic criticism; and his *Heathenism and Judaism, the Vestibule of the History of Christianity*, is a most masterly survey of the religious, moral, and social condition of the world at the advent of our Lord. It was quickly followed by *The First Ages of Christianity*, to which it had been designed as an introduction. During the early discussions on Italian unity, D. delivered an address at Munich, which was represented as hostile to the temporal sovereignty of the pope. In order to explain his real

opinions on that important question, D. published in 1861 an elaborate work entitled *The Papacy and the Temporal Power*, which was partly a comparative survey of the condition of the non-Catholic communions, and of the church, and partly a *résumé* of the history and condition of the papal states; showing that, while the temporal sovereignty was the means providentially established for maintaining the spiritual independence of the papacy, yet it was by no means essential; that the papacy long existed without it, and that even if it were overthrown, Providence would devise another means of attaining the same end. The second part was a criticism of the administration of the papal states, which is understood to have given dissatisfaction to the authorities, as being, although well meant, inopportune, and from this inopportuneess, unfriendly. A similar feeling is said to have been drawn forth by the part taken by Dr. D. in reference to the "Catholic union," some of the principles of which were supposed to trench dangerously upon the province of authority in matters of religious inquiry; but his orthodoxy and learning were unquestioned, and his influence, especially among Catholics of his own nationality, was very great until the approach of the time for the celebration of the council of the Vatican. It being understood that the doctrine of the infallibility of the pope would form a subject of discussion, D. took an active part in organizing an opposition. Articles which appeared in the *Augsburg Gazette*, in Mar., 1869, and which were reprinted more fully under the *nom de plume* "Janus," were ascribed to him or to his influence; and during the discussions of the council, he was entirely identified with the party opposed to the Ultramontane view. On the publication of the decree of the council, which defined the infallibility of the pope in all doctrinal teachings on faith and morals addressed *ex cathedra* to the universal church, D. refused to accept the doctrine. In Oct., and in depreciation of the impending censure of excommunication by the archbishop of Munich, he published an address to the archbishop, in which he claimed to be heard in the synod of German bishops, or before a committee of the cathedral chapter. His declaration on papal infallibility called forth replies from Dr. Hergenröther and others, and was accepted, on the other hand, by the so-called old Catholic party. D. was elected rector of the university of Munich (Feb. 29, 1871) by a large majority of votes. Persisting in his refusal to submit to the authority of the council, he was excommunicated by the archbishop of Munich on the 18th of April, 1871. In 1874, Dr. D. presided over the "old Catholic conference" at Bonn, where he frankly declared that he and his colleagues did not consider themselves bound by the council of Trent. He also introduced a declaration, adopted unanimously, that the eucharistic celebration in the church is not a continuous repetition or renewal of the great propitiatory sacrifice. His literary activity was little diminished. In relation to the prophecy of Orval, and other French prophecies supposed to bear upon the late war with Germany, he published in 1873 an elaborate essay on *Prophecies and the Prophetic Spirit*, which has been translated into English by Alfred Plummer. In addition to his accomplishments in book-learning, Dr. D.'s attainments as a linguist, both in ancient and modern languages, were very remarkable. In 1871, D. received the honorary degree of D.C.L. from Oxford university; and in 1872, that of LL.D. from Edinburgh. In 1872, the king of Bavaria conferred on him the order of merit; and in 1874, the emperor of Germany the order of the red eagle, second class. In 1873 he was appointed president of the royal academy of science at Munich. He d. 1890. See OLD CATHOLICS, and Michael's *Life* (1892).

DOLLOND, JOHN, a distinguished optician, inventor of the achromatic telescope, was descended from a French refugee family, and b. in London, June 10, 1706. His father was an operative silk-weaver, in humble circumstances, and D. was also brought up to that occupation. Engaged at the loom all day, he devoted great part of the night to his favorite studies of mathematics, optics, and astronomy. Not content with these, he turned his attention to the most varied subjects, made himself acquainted with anatomy, and even theology, and went so far in the study of the classical languages as to translate the Greek Testament into Latin. French, German, and Italian also, he knew well. He apprenticed his eldest son, Peter, to an optician; and after the latter had established himself in business on his own account, he was joined by his father in 1752. John D. now devoted himself to the improvement of the dioptric telescope, in which he was encouraged by the most distinguished scientific men of the time. After a series of well-contrived experiments and researches, carried on for several years, he succeeded in constructing lenses that produced images without any colored fringe. See ACHROMATIC. This was undoubtedly the greatest improvement that the telescope had received since its first invention. The memoir (published in the *Philosophical Transactions* for 1758) in which he gave an account of his investigations, was rewarded by the council of the royal society with the Copley medal. In 1761, D. was elected a fellow of the royal society; his death took place on the 30th of Nov. of the same year. His two sons continued to carry on the business with great reputation and success.

DOLLY SHOP, the name popularly given in London to a shop where rags and other kinds of old articles are bought, and over the door of which a black dolly is usually suspended. It is understood that dolly shops are in many instances a kind of unlicensed pawnbroking concerns. For small articles a few pence are given, on the understanding that the seller can buy them back at an advance some days after. In Edinburgh and

Glasgow, shops of this kind are known as *ice parlors*, and give some concern to magistrates and police.

DOLMEN, the name given in France to what British archaeologists call a cromlech (q.v.). The dolmen, properly so called, consists of *one* large unhewn stone resting on two or more unhewn stones placed erect in the earth. But the name is sometimes applied to structures where several blocks are raised upon pillars, so as to form a sort of gallery. One of the most remarkable monuments of this kind is the *Pierre Couvert*, about a mile and a half from Saumur. It is 64 ft. long, about 15 ft. wide, and about 6 ft. high. It has four stones on each side, four on the top, and one at each end. The stone at the e. end has fallen down; all the others appear to be as they were originally placed. Some of them are of great size, one on the roof measuring 24 ft. in length, and more than 2 ft. in thickness. All are of the sandstone of the neighborhood. The floor is unpaved. Dolmen is believed to be a Celtic word, signifying a stone table. The monuments to which the name is given are supposed to be the sepulchers of the ancient Celts or Gauls.

DOLOMIEU, DÉODAT-GUI-SYLVAIN-TANCRÈDE GRATET DE, 1750-1801; a French geologist and mineralogist. He was one of the knights of Malta when a boy, and fought a duel with and killed a brother knight, for which he was condemned to death, but was saved in consequence of his youth. He then turned his attention to science, and visited Spain, Sicily, and the Pyrenees. He minutely described the earthquake in Calabria in 1783, and in later years studied the Alps, where he discovered the mineral "Dolomite," which is named after him. He became professor in the school of mines and a member of the institute from its formation. In 1798, he was on the scientific staff of Bonaparte's expedition to Egypt. Here he lost his health, and on the way home was left at Messina, where he was an object of political hatred because he had revealed to the grand master of Malta the designs of the Neapolitans against that island. He was confined in a wretched dungeon, clothed in rags, and given only a bed of straw. There he was kept 21 months. Denied writing materials, he made a pen from a piece of wood, and with the smoke of his lamp for ink, wrote on the margins of his Bible—the only book he possessed—his *Traité de Philosophie Minéralogique*, and *Memoire sur l'Espèce Minérale*. At the conclusion of the treaty between France and Naples, he was released, and took the chair of mineralogy in Paris, made vacant by the death of Daubenton.

DOLOMITE, BITTER SPAR, or MAGNESIAN LIMESTONE, a mineral consisting of carbonate of lime and carbonate of magnesia in somewhat variable proportions, sometimes nearly equal, the carbonate of lime often greatly preponderating; and usually containing also a little—sometimes nearly 20 per cent—of carbonate of iron. It is softer than limestone; usually white; sometimes gray, yellow, or brown; and occurs compact, cellular, or porous, granular, foliated, and crystallized. Its crystals are usually rhomboidal, and its cleavage is rhomboidal. It is readily distinguished from limestone by its feeble effervescence in acids. It occasionally occurs in veins, accompanied with quartz, calcareous spar, etc., but also as a rock, and forms mountain masses. It is often used as a building stone; the new houses of parliament are built of it. It is also burned and made into mortar, but the lime obtained from it remains much longer caustic than lime from common limestone; and if spread on land in the same quantity, impairs rather than increases the fertility of the soil.—*Brown spar* (q.v.) is a variety of dolomite.

DOLORES, a s. western co. of Col., formed in 1881; 1000 sq.m.; pop. '90, 1498. It is watered by the Dolores river and contains several lofty mountains. Co. seat, Rico.

DOLPH, JOSEPH NORTON, b. N. Y.; was admitted to the bar, 1861; practiced law in Schuyler co., N. Y., 1861-62; was orderly sergeant in the "Oregon escort," 1862; settled in Portland, Oregon, 1862; became city attorney, and dist. attorney, 1864; state senator, 1866, '68, '72, '74; and was elected U. S. senator, 1882 and 1888. He d. in 1897.

DOLPHIN, *Delphinus*, a genus of *cetacea*, the type of a family, *delphinidae*, which is characterized by a moderate size of head—differing in this from the *catodontidae* or *physeteridae* (see CACHOLOT)—and usually by having numerous simple and conical or nearly conical teeth in both jaws, although some of the species lose those of the upper jaw at an early age. The blow-hole is single. The family *delphinidae* includes, along with the dolphins, porpoises, grampus, etc., many animals, which on account of their larger size are very commonly called *whales*, as the beluga or white whale, the caaing whale, the bottlehead, etc. It contains also a few species, which inhabit, not the ocean, but tropical and sub-tropical rivers, as the soosoo of the Ganges and the *inúu* of the Amazon. The true dolphins have the snout prolonged into a rather slender beak, which is not only abruptly separated from the convex forehead, but even by a marked furrow. Both jaws are furnished with numerous equal teeth. The species are numerous, most of them recently discovered, and none of them apparently having the very wide geographical range formerly ascribed to the common D. (*D. delphis*), with which they were confounded. They are very voracious animals, and are said to prey not only on fishes, medusæ, cephalopods, etc., but even on the wounded and feeble of their own species. They live, however, in herds, which often delight the voyager in the ocean solitude by the gambols which they perform around his ship. "They may be discerned at a great distance; as they are con-

tinually leaping from the surface of the sea, an action which, as it seems to have no obvious object, is probably the mere exuberance of animal mirth. When a shoal is seen thus frolicking at the distance of a mile or two, in a few moments, having caught sight of the ship, down they come trooping with the velocity of the wind. When arrived, they display their agility in a thousand graceful motions, now leaping with curved bodies many feet into the air, then darting through a wave with incredible velocity, leaving a slender wake of whitening foam under the water; now the thin back-fin only is exposed, cutting the surface like a knife; then the broad and muscular tail is elevated as the animal plunges perpendicularly down into the depth, or dives beneath the keel to explore the opposite side.

The common D. is found in the Mediterranean and in the northern Atlantic ocean. It is usually not more than 6 or 8 ft. long, but individuals have been seen of 10 feet. The body tapers towards the tail. The tail is crescent-shaped, and about a foot in breadth. The beak is about 6 in. long. The blow-hole is crescent-shaped, with the horns directed backwards. The color is blackish on the back, grayish on the sides, and a satiny glistening white beneath. The female D. brings forth a single young one at a time, which she suckles and nurses with great care. Although an inhabitant of the ocean, the D. emits a peculiar murmuring or suppressed lowing cry. The flesh of the D. was formerly considered a delicacy, and sailors still regard the capture of one as a happy event.

From the form of its beak, the D. receives from the French the names of *bec d'oie* (goose-beak) and *oie de mer* (goose of the sea). It was very differently regarded and designated by the ancient Greeks: it was their *hieros ichthys* (sacred fish), was invested with many fabulous attributes, and was the subject of many mythological legends. It was supposed to be peculiarly friendly to men. It was sacred to Apollo, who was worshiped at Delphi with dolphins for his symbols. The figure of the D. appears on many ancient coins and medals: it is said to have been borne on the shield of Ulysses; it early appeared on the shield of some of the princes of France, and gave its name to one of the fairest of the French provinces, from which the heir-apparent of the French throne came to be styled the dauphin. It is not easy to account for the high regard in which the D. was anciently held; nor is it altogether easy to explain the very general transference of its name in modern times to the coryphæe, a very different creature, remarkable for those changes of color in its dying moments which poets have delighted to celebrate.

Of the other species of D. one only occurs, and that but rarely, in the British seas, the bottle-nosed D. (*D. tursio*), which is said sometimes to attain a length of 24 feet. It appears to belong to the northern parts of the world.

Dolphins not unfrequently enter the mouths of rivers. A D. of the Arctic ocean (*D. leucas*) ascends into the fresh water of the Obi, to prey upon the ascending fishes of various kinds. See *illus.*, WHALE, ETC., vol. XV.

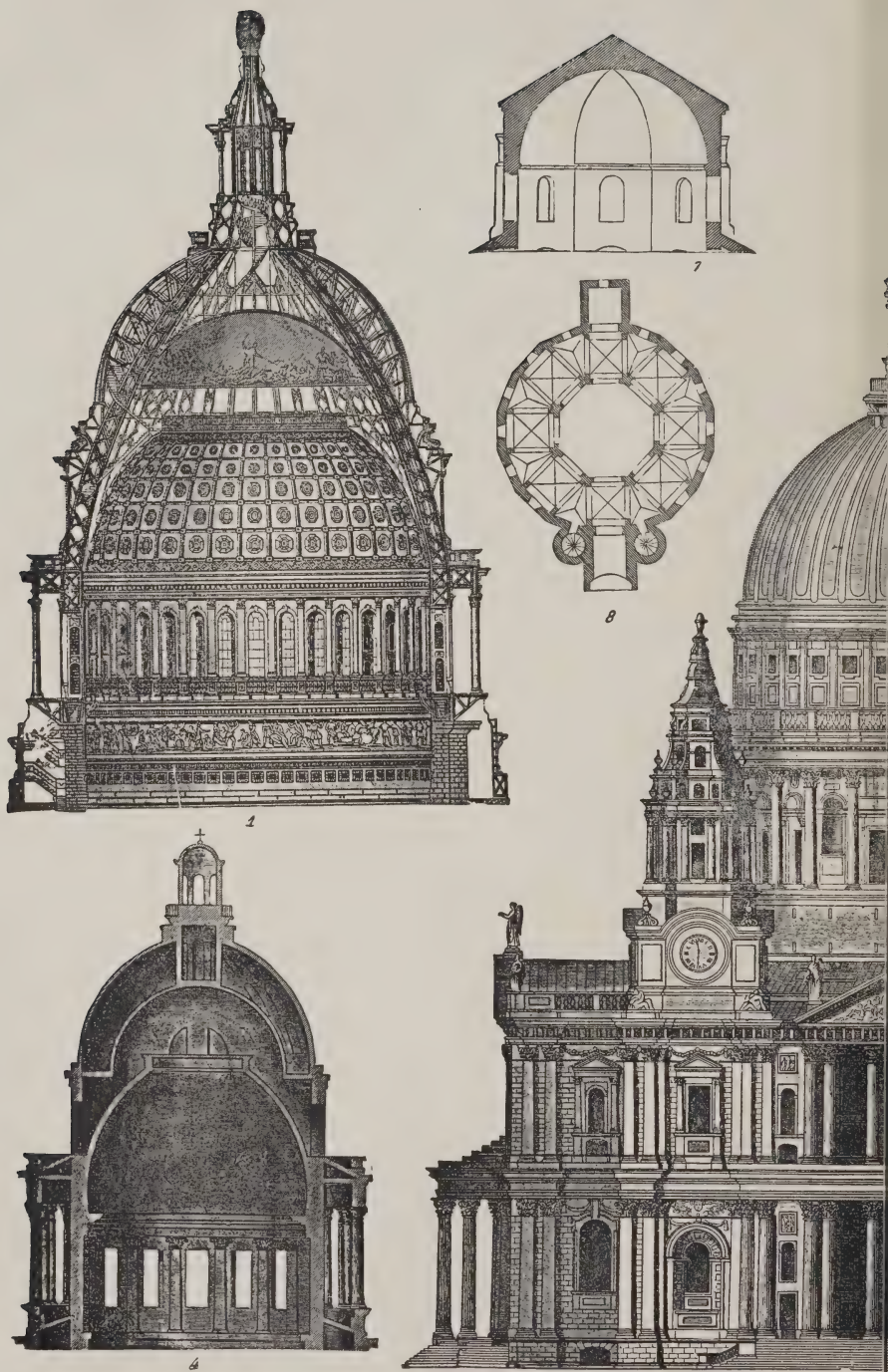
DOLPHIN, BLACK, *Aphis fabæ*, a species of *aphis* (q. v.), or plant-louse, which infests the bean, and often does considerable injury to crops, sucking the juices of the plants and preventing the development of flower-buds. It is of a dull, black, or dark-green color, the young spotted with silvery white. The first that appear are all wingless, but by and by winged individuals are produced, and the pest spreads with great rapidity. It is in the succulent tops of the plants that the aphides first appear, and a common practice of gardeners is to remove the tops in which they are observed.

DOM, or **DON** (from Lat. *dominus*, lord). This title was originally assumed by the popes, from whom it descended, in France at least, to bishops and other dignitaries, and finally to monks. In Portugal, the title *dom* is confined to the sovereign and his family. The Spanish *don* was originally confined to the nobility, but is now bestowed by courtesy as indiscriminately as the English *Mr.* or *gentleman*. The feminine *doña* is, in like manner, given to ladies.

DOMAIN. See DEMESNE.

DOMAT, or **DAUMAT**, JEAN, 1625-96; a French writer, known chiefly from his elaborate digest entitled *Lois Civiles dans leur Ordre Naturel Suivies du Droit Public*, for which Louis XIV. settled upon him a pension of 2,000 livres. The work was published in English in 1722, and has passed through several editions.

DOM-BOC, or **DOOM-BOOK** (book of dooms or sentences, *liber judicialis*), the code of laws compiled by king Alfred, chiefly from the west-Saxon collection of his own ancestor Ina, but comprising also many portions of the Kentish collection of Ethelbert, with the supplements of his successors, and of the Mercian laws of Offa. "Ina's collection," says Dr. Pauli, "was the only one received entire into the Codex, which was chiefly applicable to the condition of the west Saxons. A few articles were admitted here and there from the Kentish and Mercian laws, but research into this matter is not possible, as Offa's book is lost." Alfred made few if any original laws, but contented himself with restoring, renovating, and improving those which he found already in existence. The west-Saxon dialect had become a written language earlier than any of the Teutonic dialects of the continent; and as the power of the clergy in Saxon England



DOMES.—1. Cross-section of capitol dome, Washington. 2. Cross-section of dome of St. Peter's, Rome. 3. Cross-section of dome of St. Paul's, London. 4. Elevation of dome of mosque at Delhi. 5. Cross-section of dome of St. Peter's, Rome. 6. Cross-section of dome of St. Paul's, London. 7. Cross-section of dome of mosque at Delhi. 8. Cross-section of dome of St. Peter's, Rome. 9. Cross-section of dome of St. Paul's, London. 10. Domes from the church of St. Taxiarchis, Athens.



1. Pantheon, Rome. 3. Of dome of the Sorbonne, Paris. 4. Of dome of the Pantheon, Paris. 5. Of dome of the Minster, Aix-la-Chapelle. 8. Ground plan of same. 9. Dome from the Dschamma

was of a more limited kind than elsewhere, the laws of England, up to the period of the Norman conquest, were administered in the vernacular speech of the people. Alfred's peculiarly Christian character is strongly impressed on his code, which begins with extracts from the Bible, "The Lord spake all these words, saying, I am the Lord thy God." Then follow the ten commandments, the part of the Mosaic law relating to criminal offenses, and passages from the New Testament, including the golden rule. Yet it should be observed, that these extracts prove not the *ecclesiastical*, but only the *scriptural* character of the *dom-boe*. The code was ratified by the Witan, as Alfred expressly informs us. In addition to Dr. Pauli's life of Alfred, now published in two English translations, the reader is referred, for information on this subject, to Thorpe's Introduction to Alfred's Laws, in the *Ancient Laws and Institutes of England*, i. p. 58.

DOMBROWSKI (properly DĄBROWSKI), JAN HENRYK, a distinguished Polish gen., was b. 29th Aug., 1755, at Pierszowice, in the district of Cracow. He entered the service of the elector of Saxony in 1770; but in 1792, on the first symptoms of the insurrection in Poland, proceeded to Warsaw. He took part in the Polish campaigns against Russia and Prussia, and exhibited such remarkable military talent, that on the termination of hostilities, Suwarrow offered him employment in the Russian service, and Prussia made him a similar offer. Both were refused, and D. went to France, where, in 1796, he was commissioned by the directory to form a Polish legion among his exiled countrymen, of which he was appointed commander. The legion brilliantly distinguished itself in the Italian campaign. While in Rome, the admirable discipline which D. preserved among his troops, raised him so high in the estimation of the senate, that it presented him with the standards which his great countryman Sobieski had taken from the Turks, when he compelled them to raise the siege of Vienna, and which he had sent to the church of San Loretto. In the campaign of 1799-1800, D. gave splendid proofs of his courage. After the peace of Amiens, D. became a gen. of division in the service of the Cisalpine republic; and after the battle of Jena, along with Wybicki, he was ordered by Napoleon (1806) to summon his countrymen to arms. His entrance into Warsaw, at the head of 12 Polish divisions, resembled a classical "triumph." At Dirschau and Friedland, he won fresh laurels. In the fatal Russian campaign of 1812, he commanded one of the three divisions of the fifth *corps d'armée*, and at the passage of the Beresina, saved from destruction the relics of Poniatowski's corps. In 1813, at the head of his Poles, he took an honorable part in the battles of Teltow, Grossbeeren, Jüterbogk, and Leipsic. After the fall of Napoleon, D. returned to Poland, and in 1815 was appointed by the emperor Alexander a gen. of cavalry and Polish senator; but in the following year he withdrew from public employment to his estate in the duchy of Posen. He died 6th June, 1818.

DOVE (Ital. *duomo*). Though often used synonymously with cupola (q.v.), a dome, in the stricter sense which it has obtained in the languages of northern Europe, signifies the external part of the spherical or polygonal roof, of which the cupola (*cupo*, or cup) is the internal part. In Italian usage, however, it has a wider signification (than even the first, being used to denote the cathedral or chief church of a town, *the house* (*domus*) *par excellence*, or house of God. The cause of the name of the building being thus applied to the form of the roof which covered it, arose from the fact, that the chief churches of Italy were at one period almost universally so roofed. In tracing the historical origin of the D., we are usually in the habit of regarding it as originating with the architecture of the eastern empire, because it was at Constantinople and in the Byzantine provinces that it was first employed in ecclesiastical structures. But it was the Romans who, in reality, were the inventors of the D., as of all the other applications of the semicircular arch. Of their success in applying it to large buildings, we have abundant proof in the ancient domes still to be seen in Rome and its neighborhood. The D. of the Pantheon is still probably the most magnificent D. in existence, and others of smaller size are to be seen in the temples of Bacchus, Vesta, Romulus, Hercules, etc. "From Rome it went to Constantinople, and from the same source, also, came the few insignificant attempts at domes in the western empire."—Fergusson's *Handbook of Architecture*, ii. 943. The peculiar form of the D. of the church of St. Sophia at Constantinople, which became the typical Christian structure of the kind, will be found fully described in the article BYZANTINE ARCHITECTURE. See PANTHEON. The D. of San Vitale, at Ravenna (q.v.), is said to be still more ancient than that of San Sophia, and is a very remarkable structure of the same class. On the church of St. Marco, at Venice, there are no less than five domes, the center one, as is usual, being much larger than the others. The interior of these domes is covered with mosaic (q.v.). So far from being peculiar to the few churches we have mentioned, domes occur in the churches of almost every town along the western shore of the Adriatic, and form, in fact, the chief architectural feature of this side of Italy. The construction of domes in modern times was revived in Rome, by the building of that of Our Lady of Loretto in 1507. But the three most celebrated modern domes are those of St. Peter's (q.v.) at Rome, of St. Paul's (q.v.) in London, and of the Pantheon (q.v.) in Paris. A very complete article on domes, which has been condensed in the *Penny Cyclopædia*, will be found in the *Encyclopédie Méthod-*

ique, under "Architecture." The following are the dimensions of some of the most important existing domes :

| | Feet diam. | Feet high. |
|---------------------------------|------------|------------|
| Pantheon at Rome..... | 142 | 143 |
| Baths of Caracalla, Rome..... | 112 | 116 |
| St. Sophia, Constantinople..... | 115 | 201 |
| St. Maria delle Fiore..... | 139 | 310 |
| St. Peter's, Rome..... | 139 | 330 |
| St. Paul's, London..... | 112 | 215 |
| St. Génévieve, Paris..... | 67 | 190 |

In modern times, domes have been constructed with iron of still larger dimensions. Thus, that of the great exhibition in Vienna was 360 ft. in width, and that of the Albert memorial hall in London, which is oval, measures 219 by 185 ft. in diameter. The D. of the capitol at Washington (see adjoining illus., fig. 1) is composed of two shells, and is the most imposing structure of the kind in the U. S. Its external diameter is 135½ ft. and its height above the roof of the main building 241 ft. The interior diameter is 96 ft., the height 55 ft., and the height from floor to ceiling, 220 ft. The D. of the state-house in Boston is 50 ft. in diameter and 30 ft. high. In Russia domes commonly have a bulbous shape. The Isaac's Church in St. Petersburg has a central D. of Byzantine form, with a diameter of 87 ft. 4 ins., and a height of 275 ft. above the floor, exclusive of the lantern, which is 52 ft. in height. This central D., which is of iron covered with copper, is surrounded by 4 smaller domes—one on each corner of the church. The largest domes constructed on the horizontal principle are those of the so-called treasury of Atreus at Mycenæ, 48 ft. 6 ins. in diameter; and of the tomb of Minyas at Orchomenos. In these, the shape adopted was that of a regular equilateral pointed arch, and the method of construction, the placing of huge stones in horizontal layers, a beehive shape being obtained by the projection of one layer beyond the other, and the structure being held together simply by the superincumbent mass of earth. This Pelasgian form was introduced into India. For a class of ancient dome-roofed structures see BEEHIVE-HOUSE.

DOMENICHINO, properly DOMENICO ZAMPIERI, a celebrated painter of the Bolognese school, was b. at Bologna in 1581, and d. at Rome in 1641. At an early age he began art study under Dionysius Calvaert, but the arbitrary methods of that teacher led to his withdrawal, and he entered the academy of the Carracci. He very soon was the successful competitor for a prize, and this unexpected triumph incited him to more determined efforts. On leaving this academy he repaired with Albani, a fellow-student, to Parma, Modena, and Reggio, for the purpose of studying the works of Correggio and Parmigiano. He then followed his friend to Rome, where Cardinal Agucchi became his first patron. D. made the acquaintance of Annibale Carracci, and on the recommendation of the latter was engaged, together with Guido, to paint the frescoes in San Gregorio. Cardinals Borghese, Farnese, and Aldobrandini employed him, and for the last named D. painted a series of frescoes representing scenes from the life of Apollo. His noted work, "The Communion of St. Jerome," now in the Vatican, was painted soon after, but the praise bestowed upon it increased the animosity of some of his rivals to such an extent that D. returned to Bologna. After a few years he was called back by pope Gregory XV., and was appointed principal painter and architect to the pontifical palace. D.'s frescoes are distinguished by correctness of design, soft delicacy, and freshness of color. The heads of his figures, in particular, are remarkable for expressive force. Of his more important works, the greater number in Italy are in Rome and Florence. Out of Italy, the Louvre possesses the largest number. Several are to be seen in the National and Bridgewater galleries in London.

DOMESDAY BOOK, or DOOMSDAY BOOK, the name of one of the oldest and most valuable records of England, containing the results of a statistical survey of that country made by William the Conqueror, and completed in the year 1086. The origin of the name—which seems to have been given to other records of the same kind—is somewhat uncertain; but it has obvious reference to the supreme authority of the book in doom or judgment on the matters contained in it. It was anciently known by several other names, such as the *Liber de Wintonia*, or Book of Winchester; and the *Rotulus Wintoniæ*, or Roll of Winchester, because it was at one time preserved in the royal treasury in that city; the *Liber Regis*, or the King's Book; the *Scriptura Thesauri Regis*, or Record of the King's Treasury (where it was long kept, together with the king's seal, under three locks and keys); the *Liber Censualis Angliæ*, or Rate-book of England.

The way in which the survey was made will be best described in the words of the contemporary writer in the *Anglo-Saxon Chronicle*. After relating how, in the year 1085, England was threatened with invasion from Denmark and Flanders, and how king William prepared for its defense by laying waste the sea-shores, and by raising the largest army that had ever been seen in the island, "billeting the soldiers upon his subjects, every man according to the land which he possessed," the annalist goes on to say that at midwinter, when the king was at Gloucester, "he had a great consultation, and spoke very deeply with his witan [i.e., great council or parliament] concerning this land, how it was held, and what were its tenantry. He then sent his men all over England, into every shire, and caused them to ascertain how many hundred hydes of land it contained, and what lands the king had in it, what cattle there were in the several coun-

ties, and how much revenue he ought to get yearly from each. He also caused them to write down how much land belonged to his archbishops, to his bishops, his abbots, and his earls, and—that I may be brief—what property every inhabitant of all England possessed in land or in cattle, and how much money this was worth. So very straitly did he cause the survey to be made, that there was not a single hyde, nor a yardland of ground, nor—it is shameful to say what he thought no shame to do—was there an ox, or a cow, or a pig passed by, and that was not set down in the accounts, and then all these writings were brought to him.”

The survey was made by commissioners called the king's justiciaries, who seem to have had the help of the chief men of every shire. By a sworn assize or jury of the sheriffs, lords of manors, presbyters of churches, reeves [i.e., grievers or overseers] of hundreds, bailiffs, and six villeins [i.e., tenants at will] of every village, they made inquest as to the name of the place; who held it in the time of king Edward (1041–66); who was its present possessor; how many hydres there were in the manor; how many homagers or vassals; how many villeins; how many cottars; how many serfs; what plowgates in demesne [i.e., reserved in the lord's own hand]; how many freemen; how many tenants in socage [i.e., tenants by hereditary right]; how much wood, how much meadow and pasture; what mills and fish-ponds; how much had been added or taken away; what was the gross value in king Edward's time; what was the present value; and how much each free-man or soc-man has or had. Of all this there was to be a threefold return or valuation: 1. As the land was held in king Edward's days; 2. As it had been given by king William; 3. As it stood at the time when the survey was made; and the jurors were to say further whether the value could now be raised.

The returns thus gathered in the several shires, and their hundreds and other subdivisions, were arranged and digested in the record which is now called the Great or Exchequer Domesday. The enumeration of the cattle and swine, which so moved the indignation of the Anglo-Saxon chronicler, was omitted from the record, doubtless because the live-stock was altering every month and year, so that an account of its numbers in any one year could not be of permanent importance; but that the enumeration was made, is proved by the records called Little Domesday and the Exon Domesday. These are believed to be transcripts of the original rolls or returns made by the conqueror's commissioners for the counties of Essex, Norfolk, Suffolk, Wilts, Dorset, Somerset, Devon, and Cornwall; and they set forth the number of horses, oxen, sheep, goats, and pigs, together with some other details left out in the compilation of the Great Domesday. The taxes were levied according to the divisions of the country given in the D. B., until 1522, when a new survey, popularly called the *New D. B.*, was made.

The mere statement which has been made of its contents, is enough to show the immense value of D. B. for all purposes of inquiry into the ancient condition of England. “It will ever,” says Dr. Lappenberg, “be found an inexhaustible source of information respecting the Anglo-Saxon and Norman constitutions, particularly the rights and revenues of the kings and their vassals, the relations of cities and towns, statistic accounts of various kinds, families and their landed members, together with innumerable matters highly interesting to inquiring posterity, but unnoticed by the chroniclers of those times, either as too well known or as worthless. An intimate acquaintance with Domesday should supply the basis of every historical account of England, particularly of its special history during the middle age.” No other country of Europe can show such a work. It was fit, therefore, that it should have been the first great English record published at the national cost. It appeared in 1783 in two folios, being printed with types cast for the purpose, so as to represent the contractions of the original manuscript, and having been ten years in passing through the press. In 1816, two supplementary volumes were published, the one containing an excellent general introduction, by sir Henry Ellis of the British museum, with indices of the names of places and of the tenants in chief mentioned in the work; the other containing four other records of the same nature: 1. The Exon Domesday, already mentioned; 2. The *Inquisitio Eliensis*, a record closely resembling the Exeter Domesday, containing the survey of the lands of the monastery of Ely, in the counties of Cambridge, Hertford, Essex, Norfolk, Suffolk, and Huntingdon; 3. The Winton Domesday, containing two surveys of the city of Winchester, one made between 1107 and 1128, the other in 1148; and, 4. The Boldon Book, a survey of the possessions of the see of Durham, made in 1183. This last work is especially valuable, as partially supplying a deficiency in the survey for D. B., which did not extend to the counties of Durham, Northumberland, Westmoreland, and Cumberland, either, it would seem, because they had been lately laid waste by the conqueror, or because his dominion was not fully established in them. A new and better edition of the Boldon Book was issued in 1852 by the Surtees society, which, in 1857, printed *Bishop Hatfield's Survey*, another record of the possessions of the see of Durham, compiled between 1345 and 1381. A new and enlarged edition of sir Henry Ellis's *General Introduction to Domesday Book*, was published in 1833, in 2 vols. 8vo. See also Stubbs' *Select Charters*, and Freeman's *Norman Conquest* (vol. v., 1876). In 1861, a fac-simile copy of that part of D. B. which relates to Cornwall, was published by the ordnance survey, as an example of what can be done by the new process of engraving called photozincography. This experiment proving successful, government has gone on publishing the rest of the D. B., county by county, in the same way.

In 1872, government ordered a general return of owners of lands, to be prepared by the local government board. This new "Domesday Book" was published in 1874-76.

DOMESTIC ANIMALS are those which, in order to turn them to his use, man has tamed or reduced in a greater or less measure from their natural wildness, and which he makes the objects of his care, and in a living state his property. Many animals are useful to man, which he has never thus appropriated. Such are the deer and other game which the hunter pursues, and fishes generally, whether of the sea, lake, or river. Man has not yet found it possible to domesticate them, or has not found it necessary or desirable to do so. Individuals, indeed, of some species may have been domesticated, and become very tame, but these are exceptional instances. In general, those only are called domestic animals which have existed from one generation to another in a state of domestication. Of almost all of them, domesticated races exist, considerably different from any that are now found in a state of nature; the peculiar circumstances in which they are placed by domestication exercising a modifying influence, like that of cultivation in plants. Domestic animals mostly belong to the classes of mammals and birds. Of mammals, those which have been domesticated are exclusively of the common quadruped form, and mostly herbivorous. The greatest number, and these among the most important, belong to the order of ruminants; some of them being valuable for their flesh, their milk, their hair or wool, their hide, etc., or as beasts of burden and of draught, some even on all these accounts. To this order belong the ox, buffalo, and yak, the sheep, the goat, the reindeer, the camel, and the llama and alpaca. Of other herbivorous quadrupeds, the most important are the horse and ass, the elephant and the hog. Of the elephant, however, although for many ages it has been much employed for various purposes in India, no domesticated race exists; the individuals which man reduces to his service being still taken as at first from among the wild denizens of the forest. Domesticated races exist of two comparatively unimportant quadrupeds of the order of rodents, the rabbit and the cavy or Guinea-pig.—Of carnivorous quadrupeds, there are only two which have been generally and thoroughly domesticated, the dog and the cat. The uses to which these animals are destined are very different from those in order to which herbivorous quadrupeds are kept in a domestic state. Analogous to one of the uses of the dog is that to which the cheetah or hunting-leopard is applied by some of the princes of India, but, like the elephant, it is only individually domesticated. The same remark may be made concerning some other animals—the otter, the civet, etc.—which in different countries are tamed or kept in confinement to meet certain purposes for which man finds it convenient to employ them. The domestication of the ferret is rather more complete.—Of birds, the most important domestic species belong to the gallinaceous order, and to the family *anatidæ* among web-footed birds. To the former belong the common domestic fowl, the turkey, the peacock, the Guinea-fowl, etc.; to the latter, the goose, duck, etc. Of other birds, none can be said to be truly domesticated, except, perhaps, one or two species of song-birds, particularly the canary. The birds used in falconry are domesticated only in the same sense as the cheetah; but it is not uninteresting to observe that man has been able to make both birds and beasts of prey his servants.—Reptiles are quite capable of being tamed, and in some countries some of them are occasionally kept in houses for killing flies, or even for killing mice and rats; but none of them can be enumerated among domestic animals. Nor, perhaps, can any species of fish be so regarded, although artificial ponds have long been in use, and some species of fresh-water fish are to a certain extent the objects of care and of a kind of culture on the part of man.—In the lower divisions of the animal kingdom, only a few species ever receive such culture, or in their living state are claimed by man as his property. All these belong to the class of insects—viz., two or three species of bee, two or three species of silk-worm moth, and two or three species of cochineal insect. These may perhaps more fitly be described as *cultivated* than as *domesticated*. See **DOMESTICATION**.

Many animals not yet domesticated might probably be added with advantage to the number of domestic animals. Adaptation to particular climates and situations might probably be found to recommend species allied to those in which great part of the wealth of mankind has long consisted, and from which still more of it has been derived. It is not impossible, also, that as the waste places of the world become peopled, animals already becoming scarce may be advantageously domesticated on account of their fur or other products for which they are now pursued by the hunter.—The principal domestic animals, however, of the present day have been domestic animals, and highly valued as such, from time immemorial. We have no record of the domestication of the ox, the horse, the camel, the dog, etc. Even the llama and alpaca, although known only to the inhabitants of the Andes and adjacent regions, were found in a state of domestication there when South America was first visited by Europeans, and their subjection to man is probably to be referred to the earliest periods of Peruvian civilization. The limitation of some domestic animals to particular countries and climates—of which we have notable instances in the camel of the Asiatic deserts, the reindeer of the arctic regions, the yak of the steep and snow-clad Himalaya, the buffalo of tropical marshes, and the South American quadrupeds just mentioned—forbid us to suppose that all the important domestic animals were domesticated by the same people and at the same

period, or that they have all spread in a state of domestication from a common center or source. Yet there are many circumstances which point to the same Asiatic region as that in which the greater number of them were first domesticated, which is commonly regarded as the cradle of the arts and sciences, and even of the human race.

DOMESTIC ARCHITECTURE. The external forms and internal arrangements of the domestic abodes of a people are far more influenced by their manners, habits, and occupations, and by the climate in which they live, than their ecclesiastical edifices and public buildings; and there is, consequently, no department of architecture which is so varied and national as domestic architecture. But not only are the circumstances of each country different in this respect—the same is the case with every department of each country, with every town in each department, with every street in each town; and a D. A. which fulfills its object, will not only adapt itself to the necessities, but will make the best, in point of artistic effect, of the specialties of every case with which it is called upon to deal. The circumstances of families, and even the tastes and fancies of individuals, are legitimate subjects of consideration in domestic architecture. To attempt to give to D. A. the beauty of uniformity, is consequently to mistake both its object and the source from which its charm is derived. When attained at all, uniformity is attained not in accordance with, but in defiance of, the utilitarian objects of domestic architecture. The results of this artistic falsehood may be seen in the monotonous and meaningless streets and squares that have been built in all our principal towns during the last eighty years. The legitimate charm of D. A., because the only one which can arise from the complete fulfillment of its object, is the charm of variety. It is the charm which our ancestors sought during the whole of the great architectural period of the middle ages, and which our architects, who in this, as in so many other respects, are returning to their principles, are now beginning to cultivate. But here, as in all similar cases, it must be borne in mind that, in general, it is the principle alone that can be revived, and that the details by which it was carried out can be legitimately copied only in the exceptional cases in which circumstances and the objects to be attained remain unchanged. The position of an American in the 19th differs in many respects from that of an Englishman in the 14th c.; and to construct for the former a house in all respects resembling that which was constructed for the latter, would be to commit an error the same in kind as if we had sought for either of them a model dwelling in Pompeii or Canton.

In no country in the world, probably, are dwellings so comfortable, so picturesque, and so well adapted to the climate as in the United States, the abundance of material, especially of wood, allowing the architect great latitude. Although no strictly original style of architecture can be evolved, certain distinctive features, such as the broad piazza, have become fixed, and the Greek temple and the Gothic castle having been discarded as unsuitable models, a pleasing regard to the history of localities is now shown, such as the return to colonial types in the Atlantic states, and to Spanish in Florida and California.

DOMESTICATION, the modification of animals by deliberate human interference with their food and surroundings, with the work or functions they perform, but especially with their breeding. The influence of man on animals extends, however, far beyond those usually regarded as domesticated, and it is not possible to draw a perfectly hard-and-fast boundary line. Man has exterminated some animals—e.g. birds, and propagated others—e.g. fishes; he has made many become rare, shy, and cunning, while others—e.g. crickets, find shelter in his dwellings; he has kept some captive, like the fish in the pond; tamed others individually for his service, like falcons and cheetahs; he has preserved some artificially from their enemies, because of their rarity, and others because of their utility, but without in any of these cases much modifying them. None of these are in the strict sense domesticated. It is only when a distinct breed has been produced by human interference—in most cases, deliberately by artificial selection—that we are justified in calling the result D. Strictly “domesticated animals” correspond to strictly “cultivated plants;” in both cases, the organisms have been modified, more or less fixedly, from their natural or wild state, by changes in food, environment, function, and breeding.

D. began long before the dawn of history (see AGRICULTURE; ANTHROPOLOGY; DOG). The domestic animals are discussed under separate articles, but a list of representative forms may be given here. Among lower animals, silk-moths (see SILK) and hive bees (q.v.) have been for long controlled, and, to a limited extent, modified. Among fishes, gold-fish (q.v.) may certainly be regarded as domesticated for decorative purposes. Birds include many illustrations of D.—pigeons, fowls, ducks, geese, peacocks, turkeys, guinea-fowls, canary-birds, etc. Among mammals, dogs and cats, horses and asses, cattle, sheep, and goats, elephants, camels, reindeer, pigs and rabbits, etc., have been domesticated, and have given rise to many different breeds. The complete list is not a long one, though it will probably be increased. To admit of D., animals must generally be social and docile in their habits, and must be capable of retaining fertility under changed conditions.

The process of D., as far as deliberate control is concerned, is for the most part equivalent to selective breeding. Forms with useful varieties are isolated from the mass, and allowed to breed together, the most desirable results are again selected for breeding, and so on, till a domesticated breed of the same animal is established (see BREED). Different

breeds differ from natural species in being usually mutually fertile. In other words, while two domestic races may be externally more different than are two nearly related species in nature, the reproductive elements in the first case cannot differ as they must do in the second. Thus crossing is usually successful between domestic breeds; only rarely between adjacent natural species. When we pass beyond selective breeding to inquire into the conditions of variation, a much more difficult problem is raised. In regard to some changes which crop up in domestic animals, we cannot do more at present than refer them to variations in the unstable germ-cells, and to the intermingling of sexual reproduction. Where the intercrossing is regulated, the importance of the latter is especially obvious. These germinal changes may, however, as the organism grows, find expression in the continually variable rhythm between nutrition and reproduction, between growth and multiplication—the great antithesis of organic life. But while considering this internal aspect, we have at the same time to recognize the importance of external influences, especially of altered climate and diet. These hinder or abet the constitutional or inherited tendencies, and may in course of time bring about important new results.

Lastly, it must be remembered how much the habit of life, the normal functions, the daily work of the organisms, are often altered under D. Some parts are more used, others less; and this is also a source of change (see SPECIES). Domesticated forms are more variable than their wild relatives; the males are more variable than the females; and the offspring of hybrids are more unstable than the hybrids themselves. The results of D. are very varied. Sometimes the changes induced and cultivated have been comparatively slight; in other cases they have amounted to the evolution of new species. Superficial alterations of color and skin, hair and feathers; deeper changes in the less plastic skeletal, muscular, alimentary, and other systems; increased fertility on the one hand, sterility on the other; alteration in mental and emotional characters; the perfecting of a racial characteristic in one case, its loss in another; general progress in some forms, utilitarian degeneration or extraordinary abnormality in others, are abundantly illustrated in Darwin's classic work on variation under D. The constant tendency to atavism (q.v.) or reversion; the danger of carrying selection of a given character too far; the limits of successful close breeding (see BREED); the bearing of facts of D. on the problems of heredity (q.v.) and evolution, are discussed elsewhere. See ACCLIMATE; CULTIVATED PLANTS; SPECIES; and Darwin, *The Variation of Animals and Plants Under Domestication* (1868).

DOMESTIC MANAGEMENT, financially considered, may be defined as the art of making a given income go the furthest possible in procuring for a family the means of living—the word living being understood in its wider and higher sense. It being assumed, as a fundamental maxim, that the outlay shall be within the income, the leading object of the art is rightly to apportion the outlay among the different requisites. How this is best to be done, can be discovered only by large experience; and if a young housekeeper were to begin her career without some indications of the path she should follow, she must fall into serious mistakes, occasioning loss and discomfort. Not that any amount of previous instruction, whether written or oral, can give the skill of experience; but attention to some of the more important maxims may help to avert very serious errors while the lessons of experience are being learned.

It is a very safe rule, that the best quality of food is the cheapest in the end; "it goes further"—i.e., it gives more nourishment; but those who require to practice economy may, by going to market themselves, purchase good meat at a cheaper rate than they would if they sent for it, from reasons known to experienced buyers, such as the pieces they select not being called prime cuts, not being so well-shaped, etc., which in no way takes from the wholesomeness of the article. Again, good cooking renders things more digestible and nourishing; bad cooking is absolute waste, to say nothing of the injury it does to the stomach. How meat is rendered tender by boiling or broiling, without having its nutritive qualities extracted, is described in the articles **BOILING** and **BROILING**. For the time necessary for roasting, baking, stewing, and frying, good instructions are given in the very useful works, *The Dictionary of Daily Wants*, and Mrs. Beeton's *Book of Household Management*, where not only the mode of cooking, but the actual cost of each dish, is given.

Some books on housekeeping recommend that coal should be bought when cheap, and that groceries should be purchased in large quantities; but this is open to objections, that coal occupies a larger space than can be spared in small houses; that many articles of grocery waste in quantity or deteriorate in quality by keeping, as sugar, which loses weight, and tea, which loses aroma; and that both coal and grocery in masses, are apt to be wasted by servants, children, and thoughtless persons, from the circumstance of having large quantities to go to. Groceries may be bought cheaper in this way, and it is only personal experience that can decide in every case as to their being really cheaper. Candles and soap are the chief things that certainly improve by keeping. Candles should be hung up, if dips, but molds should be stored in boxes, and covered and kept in a dry place. Soap bought in bars, in as dry a state as possible, should be cut in lumps, six to the bar, and laid on shelves, to harden slowly.

A thorough knowledge of the art of choosing material for clothing, and making and cleaning articles of apparel, is also highly necessary, and, like good marketing for food,

can only be acquired by practice. Many things must be considered in this kind of purchase: the evenness of the threads in cotton and linen fabrics, softness of texture, freedom from what is called "dress." In printed goods, the same rule is to be observed as to evenness of weaving, in addition to which, those kinds should be selected that have the pattern printed through, so as to show on the wrong side, and of a lilac or dark-blue color, as being the best for washing. Flannel goods should be chosen for their regular make, good width, and softness; and flannel articles should be made larger and longer than necessary, to allow for shrinking when washed. Good patterns for making from should be obtained, well-fitting and appropriate dress lasting longer and looking better than what is put together in an inconsiderate, slovenly manner; a clever needlewoman, like a clever cook, is the most truly economical one. The same remarks apply to furniture chintzes and linens for sheetings, etc.

DOMETT, ALFRED, C.M.G., 1811-87; statesman and poet; b. in Surrey, England. He entered St. John's coll. in 1829, but left in 1833 without a degree. In 1833 he published a vol. of poems, and from 1837-39 contributed verses to Blackwood's Magazine, one of which, "A Christmas Hymn," has attained great popularity. In 1839 a second vol., a poem on Venice, was published. In 1841 he was called to the bar at the Middle temple; in 1842 purchased land in New Zealand and emigrated to that country, his intimate friend, Robert Browning, lamenting his departure in a poem entitled "Waring." D. became colonial sec. for New Munster in 1848; sec. for the colony of New Zealand in 1851; commissioner of crown lands and resident magistrate at Hawke's bay, 1853-56; member of parliament for Nelson in 1855; prime minister in 1862; sec. for crown lands, legislative councillor, and commissioner of old land claims in 1864; registrar gen. of land in 1865, and administrator of confiscated lands in 1870. He returned to England in 1871. The friendship of D. and Browning is celebrated in the latter's *Guardian Angel*. D. pub. *Ranolf and Amolia, a South Sea Day Dream* (1872); *Flotsam and Jetsam* (1877), dedicated to Browning; and (while in New Zealand) several official publications.

DOMETT, Sir WILLIAM, K.C.B.; G.C.B., 1754-1828; b. England; admiral; entered the navy in 1769; in 1777 was made lieut., and took part in the action off Ushant, July 27, 1778; under Capt. Cosby, in the action off Cape Henry, Mar. 16, 1781, and in the action of the Chesapeake, Sept. 5, 1781. Becoming signal officer under sir Samuel Hood, he served in the operations against St. Kitts, Jan., 1782, and in the action off Dominica, Apr. 12, 1782. A few days afterwards he captured 4 of the enemy's vessels, was promoted to the command of one of them, and subsequently was advanced to post rank and appointed as flag-capt. to Rear-Admiral Hood, aiding in the relief of Gibraltar. After being employed on the coast of Scotland, in the West Indies, and Newfoundland, he served as flag-captain 1790-1800; in 1801 was appointed capt. of the Baltic fleet; next, capt. of the fleet off Brest; in 1804 was appointed rear-admiral; aided in revising the civil affairs of the navy; in 1808-13 was on the board of admiralty; was made vice-admiral in 1809 and admiral in 1819.

DOMICILE, in common speech is used as synonymous with home or place of abode; in the strict legal sense it denotes the place which the law will hold to be a man's residence. Vattel defines one's domicile as his habitation fixed in any place with an intention of *always* staying there. This definition is now regarded as too strictly limited by most authorities on international law, certainly by the best writers on the subject in the United States. It is held that in a comparatively newly settled country like this absolute permanence of residence is rare, and it is sufficient to constitute a domicile that the habitation be fixed without any present intention of removing therefrom. Justice Story says, "Two things must concur to constitute a domicile—first, a residence, and, second, the intention of making it the home of the party"; to which Dr. Woolsey—undoubtedly the best authority among American writers on international law—adds, "and when once a domicile is acquired it is not shaken off by occasional absences for the sake of business or pleasure, or even by visits to a former domicile or to one's native country." It follows that the same person may be a citizen of one country, possess a domicile in another (for the questions of domicile and citizenship are quite distinct), and temporarily reside in still a third. Another American authority, Wharton, distinguishes three kinds of domicile: domicile by birth, by choice, and by operation of the law. The first is decided by the place of nativity, the second is acquired by a man's own volition, and an illustration of the third is the domicile of a wife, being that of her husband acquired by her at the time of marriage. A child, of course, has the domicile of his parents and is considered incapable of changing his domicile of his own accord; but he follows, of course, any change in the domicile of the parents. When the father of a family dies, the domicile of his children and widow continue to be that of his last residence until a new one is acquired in any of the ways already indicated. The question as to what amounts to a sufficient intention of permanent residence to cause an immediate change of domicile is one of no little difficulty, and which must be determined by evidence and the special facts of each case. In its relation to legal actions and rights the rule may be laid down in a general way that the law of the place of domicile governs in contracts relating to personal property and in the matter of wills and bankruptcy, while on the contrary in matters relating to real estate the law of the place of its situation (*lex rei sitæ*) prevails. In England it was

formerly held that it was necessary to the validity of a will that it should be executed according to the law of the testator's domicile, no matter where the will was drawn; but statutes now provide that the will is valid if it were executed in accordance with the law of the country where it was made, even though it do not conform to the law of the place of permanent and recognized domicile. Similar provisions exist in most or all of the states in this country. The question of domicile is often of importance in determining property rights in time of war. Thus it is held that the property of an alien domiciled in a country with which his own nation is at war is subject to seizure as that of an alien enemy. Under a strict construction of the common law, also, an alien cannot (without regard to the existence of war or peace) hold land, either by purchase or inheritance; but in many of the American states this rule has been directly abolished by statute as opposed to the natural policy of this country, and in others it has become obsolete by general consent. Under the Roman or civil law it was considered that a man might legally hold two domiciles, as when he resided part of the year in one place and part in another, or when he maintained two businesses in separate places; but the laws of the United States and England do not recognize such an idea. In matters of taxation and in the application of the poor laws the term domicile is often used, sometimes loosely, and its definition is often of importance in deciding such matters; the courts will often in such questions give the word the more restricted meaning attached to the words dwelling place, home, or residence. It has been held by several American courts that the domicile of a sailor is the place where he voluntarily spends most of his time when on shore.

DOMINANT, in music, the fifth above the tonic: the ruling or governing tone of the key. Ancient writers called the D. the *quinta toni*, from its being the next in importance to the tonic. The D. chord is always a major chord, the third being the *subsemitonium modi*, or leading note, which always rises a semitone to the tonic. The D. seventh is the major chord with the flat seventh above the D., and is the same in major and minor keys. The rules for the treatment of the D. seventh, and for the chord of the ninth on the D., apply to all other chords of the seventh or ninth, which arise from the other degrees of the scale. The D. seventh is a most important chord in modulation. The resolution of the D. seventh is always into the chord of the tonic, when not interrupted. The D. as a key is the nearest in relation to the tonic. Modulation into the key of the D. is so frequent in composition, that its form may be said to be stereotyped. The subdominant, or under-dominant, stands next in importance to the D., and has its place on the fourth above the tonic, or, which is the same, on the fifth below. The chord of the subdominant is major or minor, according to the mode of the key. The chords on all other degrees of the scale being either minor or diminished, give greater importance to the major chords of the tonic, D., and subdominant, in which chords all the notes of the scale are found, while the combination of these chords, giving the most perfect impression of a key, may account for their being of such importance in harmony.

DOMINANT TENEMENT. See **SERVITUDE**.

DOMINGO, SAN or SANTO, a maritime city of Hayti, capital of a province of the same name, and of the republic of San Domingo or the Dominican republic, stands on the s.e. coast, at the mouth of the Ozama, in lat. 18° 29' n., and long. 69° 57' west. It is the oldest settlement of European origin in America, having been founded in 1496 by Bartolommeo Columbus. The pop. numbered (1892) 14,150. The city contains the government buildings, churches, including a cathedral, which is supposed to contain the remains of Christopher Columbus, convents, hospitals, colleges, and a light-house, etc. The streets are broad, and intersecting at right angles. The chief trade is in timber and dye-woods. The name S. D. is sometimes applied to the whole island of Hayti. See **HAYTI** and **DOMINICAN REPUBLIC**; also **SAN DOMINGO**.

DOMINIC, SAINT. See **DOMINICANS**.

DOMINICA, or **DOMINIQUE**, a British West India island, lies in lat. 15° 18' n., and long. 61° 24' w., containing about 290 sq. m. It is of volcanic origin, hot and sulphureous springs still attesting the fact. It is the loftiest of the Lesser Antilles, attaining at one point, an elevation of 5314 ft., and nearly one-half of the surface consists of precipitous mountains and deep ravines. Where capable of cultivation, the soil is fertile; and, even on apparently inaccessible sites, the emancipated negroes have successfully established provision grounds. The principal productions are sugar, coffee, cocoa, cotton, lime-juice, molasses, rum, tamarinds, sulphur, indigo, rose-wood, and other cabinet woods. The principal industry is sugar planting. It has great natural resources, but the population, according to the census of 1891 was only 26,841, while in 1881 it was 28,211, and the exports for 1893 and subsequent years showed a falling off. In 1893 an inquiry was made into the causes of the industrial depression in the island. The result of this investigation was the alteration of the government in such a way as to place more power in the hands of the British administrative officer. The government consists of this officer or administrator, of an executive council, and of an assembly consisting of 7 elected and 7 nominated members. The chief harbors are Roseau on the western coast, and Prince Rupert Bay on the northern coast. The population consists principally of natives. The whites are chiefly Catholics of French descent. There were, in 1891, about 300 of the aboriginal Caribs. The abolition of slavery worked well

in Dominica. In 1839 the planters at a public meeting acknowledged, "with feeling of unmixed gratification, the peaceable and quiet disposition evinced by the laborers, as a body, since their entire emancipation;" and in 1852 the lieutenant-governor officially adverted to the prosperity and contentment of the same class. The temperature, according to season and altitude, ranges from 88° F. down to chilliness; and even in the dry months, from Feb. to Aug., rain frequently falls. D. was discovered by Columbus, on his second voyage, in 1493, on a Sunday (whence its name Dominica, i.e., the Lord's day), being then thinly inhabited by Caribs. From the commencement of the 17th c. to the middle of the 18th, it may be described as having been a neutral island; but in 1759 it was captured by England, and permanently ceded by France in 1763. In 1802 it again came into the possession of France, but was finally handed over to England in 1814.

DOMINICAL LETTER, or **SUNDAY LETTER**, is one of the seven letters A, B, C, D, E, F, G, used in almanacs, etc., to mark the Sundays throughout the year. The first seven days of the year being marked in their order by the above letters in their order, then the following seven, and all consecutive sets of seven days to the end of the year, are similarly marked; so that the 1st, 8th, 15th, 22d, etc., days of the year are all marked by A; and the 2d, 9th, 16th, 23d, etc., by B; and so on. The days being thus marked, it is evident that on whatever day the first Sunday of the year falls, the letter which marks it will mark all the other Sundays in the year, as the number of the letters and of the days in the week is the same.

As the common year consists of 52 weeks and one day over, the dominical letters go backwards one day every common year. If the D. L. of a common year be G, F will be the D. L. for the next year. As a leap-year consists of 52 weeks and two days, the letters go backwards two days every leap-year. If in the beginning of a leap-year the D. L. be G, E will be the D. L. for the next year. This extraordinary retrocession, however, is made to take place at the intercalary day (the 29th Feb.) by the artifice of marking it by the same letter as the day preceding it, and thus the next Sunday is marked by the letter preceding that which marked the Sundays before the intercalary day. Suppose the 28th Feb. in a leap-year to be a Sunday, and marked by F, it is evident that the D. L. for the rest of the year will be E. As every fourth year is a leap-year, and the letters are seven in number, it is clear that the same order of letters must return in four times seven, or 28 years, which would, but for the leap-years, recur in seven years, and hence the solar cycle (see **PERIOD**). The dominical letters were first introduced into the calendar by the early Christians, to displace the nundinal letters in the Roman calendar. They are of use as a means of discovering on what day of the week any day of the month falls in a given year. See **EASTER**. Rules and tables for finding them are given in prayer-books, breviaries, etc., as well as in works on dates. See **DATE**.

DOMINICAN REPUBLIC, a state formed of the Spanish or e. section of Hayti (q.v.). Spain, in 1697, surrendered to France, by the treaty of Ryswick, the w. part of the island, retaining the remainder down to 1795. In the year last mentioned, however, the Spanish portion became nominally French. In 1814—the west having vindicated its independence—France formally relinquished, in favor of Spain, all claim to the east. In 1822, the colony, in imitation of the continental possessions, threw off the yoke of the mother-country, to link itself, more or less closely, with its African neighbors. But in or about 1843, it assumed a separate standing as the Dominican Republic, the anarchy of which it exchanged in 1861 for the despotism of its former masters. But in 1865, having again revolted, Spain gave up the possession, and the republic has since maintained a troubled existence. The D. R. has an area of 18,000 sq. m., nearly two-thirds of the area of the whole island. Its principal productions are sugar, cocoa, bananas, and coffee. Its pop., chiefly negroes and mulattoes, was estimated (1888) at 610,000. Estimates in 1893 placed it at 550,000. The capital, San Domingo, contains 14,150 inhabitants. See **SAN DOMINGO**.

DOMINICANS, an order of preaching friars in the Roman Catholic church (*fratres predicatorum*), founded at Toulouse in 1215 by Dominic (Domingo) de Guzman. Dominic was born at Calahorra, in Old Castile, in 1170. He studied theology at Palencia, and in 1199 became canon and archdeacon of Osma in Castile. In 1205, along with his superior, Diego de Azabes, bishop of Osma, he began to itinerate through the s. of France, for the purpose of converting the "heretical" Albigenses; and convinced that the ignorance of the people and the worldliness of the clergy were great helps to the progress of heresy, he instituted the order which bears his name, for the express purpose of preaching and the cure of souls. Dominic, however, found it impossible to convert the Albigenses by this method, and therefore had recourse to another. In 1208, at the instigation of Dominic, the pope proclaimed a crusade against these "heretics;" the barons of France were summoned to take part in it, and headed by De Montfort, committed horrible slaughter on these unfortunate people. The order of the D. was confirmed by Innocent III. and Honorius III. in 1216. The members followed

the rule of St. Augustine, somewhat modified; their dress was a white garment, resembling that of the Carthusians, with a black cloak and pointed cap of the same color. In 1220 they took the vow of poverty. Dominic died at Bologna in 1221, and was canonized by Gregory IX. in 1233. He is said to have been ordinarily not a cruel or unfeeling man, but his religious passions were so vehement, that they entirely dried up the milk of human kindness in his heart, and his conduct towards heretics was merciless in the extreme. As early as 1206, he founded an order of Dominican nuns, which, after 1218, when the first convent was established at Rome, spread far and wide. These nuns followed the same rule as the friars, and were solemnly pledged to habits of industry. A third Dominican order (the Knights of Christ) was established in 1224, and confirmed in 1279. It was originally a company of knights and nobles who had leagued themselves together for the suppression of "heresy" by force of arms, but after the death of its founder, the order was changed into that of the *Penitents of St. Dominic*. The members of this branch of the D. were also called the Tertiary Dominicans. They were not bound by any vows, but their special duties were to observe particular fasts and devotions, and to execute great ecclesiastical judgments. They retained all their civic and domestic privileges. There were also *female Penitents of St. Dominic*, a few of whom, however, betook themselves to a conventual life, and became nuns. These few were chiefly in Italy; the most famous was St. Catharine of Siena. The glory of apostolic poverty, which encircled the D., the privileges which they possessed—especially of preaching and hearing confession—and the circumstance that as early as 1230, only 15 years after the foundation of their order, they secured a chair of theology in the great university of Paris, all helped to rapidly increase their numbers and influence. Within *six* years after their establishment, they had spread to England through one Gilbert du Fresney, and founded a monastery at Oxford. "The monks," writes a contemporary annalist, Matthew Paris, himself a Benedictine, "did not, in three or four hundred years, ascend to such a height of greatness as the friars, minors and preachers, within twenty-four years after they began to build their first house in England." Their progress was scarcely less rapid in Scotland, where they found a munificent patron in king Alexander II., who is said to have met St. Dominic at Paris about the year 1217. In Britain, the D. were called the *Black Friars*. In France they received the name of Jacobins, from the Rue St. Jacques (Lat. *Jacobus*) in Paris, where they first established themselves. Their monasteries arose throughout all Christendom, and were even to be seen on the shores of Asia, Africa, and subsequently America. Their monarchical constitution, which bound all the branches and congregations of the order under one grand head (*magister ordinis*), insured their progress and the co-operation of their efforts to secure influence in church and state. Through their preaching and proselytizing, it is undeniable that they exercised, at the time of the foundation of their order, and for a considerable time after, an influence alike extensive and beneficial. They have produced several great scholars and men of genius, such as Albertus Magnus; Thomas Aquinas, the normal theologian of the Roman Catholic church; and Raymond de Penafort. They have, however, acquired a black reputation in history in connection with the inquisition (q. v.), in which they were the chief agents. After 1425, when they obtained permission to accept endowments, they in some measure refrained from begging, and engaged themselves more with politics and theology. Their great rivals were the *Franciscans* (q. v.), and the mutual animosity of the two orders was strongly exhibited in the disputes of the Thomists and Scotists. These two orders divided between them the honor of controlling the church, and often the Catholic states of Christendom, until the rise of the Jesuits in the 16th c., who gradually drove both from the schools and the court, when the D. were compelled to return to their original vocation. Their power was, however, again revived to a certain extent in 1620, when the censorship of books was conferred on the master of the Vatican at Rome, who must always be a Dominican. In the 18th c., the order of D. possessed 1000 monasteries and convents, divided into 45 provinces, besides 12 separate congregations or sects. At present, the order flourishes only in Italy, France, Hungary, Switzerland, and America. The Dominican nuns, who are not numerous, have convents in Italy, France, Belgium, Hungary, Bavaria, and America. See *illus.*, PRIESTS, MONKS, AND NUNS, vol. XII.

DOMINION, THE OLD. See STATES, POPULAR NAMES OF.

DOMINIS, MARCUS ANTONIUS DE, an ecclesiastic whose career was both singular and checkered. He was b. in 1566 at Arba, on the coast of Dalmatia, and educated, first at Loretto, and subsequently at Padua, where he greatly distinguished himself both by his ability and the varied character of his studies. While at Padua, he taught mathematics, physics, and eloquence. Having completed his theological curriculum, he was, after some time, appointed bishop of Segni, and two years later, archbishop of Spalatro, in which capacity, however, he quarreled with the pope, and having, moreover, exhibited certain Protestant leanings, he found it expedient to resign his post. In 1616, he came to England, where he was hospitably received. King James appointed him dean of Windsor; and while holding this office, he wrote his *De Republica Ecclesiastica*, a work in which he endeavored to show that the pope had no supremacy over other bishops, but was only *primus inter pares*. D. published one or two other productions between 1617 and 1618; but finding Anglicanism far from satisfactory, a revulsion of feeling occurred, and D. once more looked and longed for the unity of the Catholic

church. The motives that induced him to return to the Roman Catholic church are not known. Most writers consider that he was actuated by avarice and ambition, but a critical appreciation of his character would lead us to doubt this harsh judgment. He was, it has been supposed, desirous of discovering a church broad enough to form the basis of a universal Christianity. Men holding such opinions are always misunderstood, and so D., even after his return to Rome, was still suspected of heresy. In consequence, he was imprisoned in the castle of St. Angelo, where he died, Sept., 1624. Being subsequently condemned as a heretic, his body was raised from its grave, and burned.

While at Padua, D. wrote his *De Radiis Visus et Lucis in Vitris Perspectivis et Iride* (Venice, 1611). He was the first to point out that in the phenomenon of the rainbow, the light undergoes, in each rain-drop, two refractions and an intermediate reflection.

DOMINIUM, a Roman law-term, which has been received into the technical language of most of the legal systems of Europe. It may be described as a full legal right in and to an object—as the right from which alone legal possession could flow, but which actual possession alone could never confer, unless such possession had endured for the period of legal prescription. The right to possess is thus distinguished from the right arising from possession, which is the usufruct. Ownership or D. may be either absolute—that is to say, it may include the beneficial interest in the subject—or it may be bare ownership, consisting in some limited power over it at the time, or some ultimate right to it at a future time. D. must not be confounded with *imperium* (q.v.), which has a totally different signification.

DOMINO, the name formerly given to the garb worn in winter by priests while officiating in cold edifices. It is now used to signify a masquerade costume, consisting of an ample cloak or mantle with wide sleeves. See **MASQUERADE**.

DOMINOS, the name of a game, usually played with 28 oblong, flat pieces of ivory or bone, etc., each of which bears two numbers marked by points from nought to six. The party wins who has first played out his tablets, or, if this has been found impossible, who has the fewest points on the tablets still remaining. The game of D. has been attempted to be traced back to the Greeks and Hebrews, and also to the Chinese. So much is certain, that it was introduced about the beginning of the 18th c. from Italy into France, where it immediately became popular in the larger towns. From Paris it spread to Germany, where, as in France, it is now played in every coffee-house. The Café de l'Opera, in Paris, long boasted of assembling the most expert players; an honor, however, which was warmly contested by the establishments of Rouen and Poitiers.

DOMINUS, the Latin word by which we commonly render lord, but which more properly signifies master, as opposed to slave (*servus*). Aurelianus is said to have been the first emperor who adopted D. as a title of honor on his medals, though it had long been made use of in conversation and in correspondence in that sense, as by Pliny in addressing Trajan. In legal phraseology, the *dominus litis* is the person really interested in the issue of an action, though not necessarily the pursuer.

DOMITIANUS, T. FLAVIUS, emperor of Rome from 81 to 96 A.D., was the son of Vespasian, and younger brother of Titus, whom he succeeded on the throne. The earlier years of his reign were on the whole advantageously occupied for the public benefit. Many good laws were passed, the provinces carefully governed, and justice rigidly administered. As he grew older, however, his ambition, his jealousy, and his pride, wounded by the failure of his campaigns against the Dacians and the Marcomanni, in 87 A.D., began to instigate him to the most atrocious cruelties. By murder or banishment, he deprived Rome of nearly every citizen conspicuous for talent, learning, or wealth. To win the army, he greatly increased the pay of the soldiers, and secured the favor of the people by prodigal largesses and gladiatorial shows and games, in which he sometimes took part in person. His cruelties became at length so intolerable, that a conspiracy—encouraged, if not organized—by his wife Domitia, whom he had doomed to death, was formed against him, and the tyrant fell under the dagger of the assassin, 18th Sept., 96 A.D.

DO MO D'OS SOLA, a charming little t. in the extreme n. of Piedmont, at the foot of the Simplon, near the right bank of the Tosa, which flows into Lago Maggiore. Its general aspect is peculiarly Italian. It has some trade and several handsome buildings, but is chiefly noteworthy as being a starting-point for tourists who wish to make excursions up the southern valleys of the Alps. The chief places of interest in the vicinity are the Val Anzasca, the Val Vigizzo, and the Falls of the Tosa. Population between 3000 and 4000.

DON (anc. *Ta'nais*), a river of Russia, has its source in a small lake in the government of Tula, in lat. about 53° 45' n., and long. 38° 10' east. It flows at first in a south-eastern direction through the governments of Tula, Riazan, Tambov, and Woronetz, and after winding s.w. through the country of the Don Cossacks, it advances to its embouchure in the sea of Azov, which it enters by three mouths, only one of which is navigable. The D. receives 80 affluents, of which the principal are the Sosna and the Donetz on the right, and on the left the Khoper, the Medveditsa, the Sal, and the Manitch. Its total length is about 1150 miles. Its course is obstructed by frequent

sand-banks, which, when the water is low, render navigation impossible to any but flat-bottomed boats. From April to June, however, during which months it overflows its banks, and forms unwholesome swamps on either side, it is navigable as high as Zadonsk, 600 m. from its mouth. The D. is connected by a canal with the Volga, and by this means the produce and manufactures of the interior are conveyed to the southern provinces of Russia. The waters of the D. abound in fish, the traffic in which commodity is considerable, especially in its lower course.

DON, a river of Aberdeenshire, rising on the w. border of the county in a peat-moss, 1640 ft. above the sea. It runs n.e., then e., and lastly s.e., entering the sea a mile n.e. of Old Aberdeen. It has a total course of 78 m., but only 42 in a straight line, and it drains a tract of 495 sq.m., chiefly composed of granite and gneiss, with a little syenite and clay-slate. In the upper part of its course, it receives some large mountain streams, but its chief tributary is the Ury, which comes 24 m. from the n.w. Near the junction of the Ury and D. is a curious conical gravel hillock, called the Bass, the subject of a prophecy by Thomas the rhymers. The D., at less than a mile from the sea, is crossed by the old "brig o' Balgownie," of one Gothic arch. Lord Byron, while a youth, had a superstitious dread in crossing this bridge, from an old prophecy connected with it.

DON, a title. See **DOM**.

DON, or **DUN**, a river of the West Riding of Yorkshire, rising in the moors on the borders of Derbyshire and Cheshire. It runs 55 m., first s.e. to Sheffield, and then n.e. by Rotherham, Doncaster, and Thorne, into the Aire, which soon afterwards unites with the Ouse. Its basin consists of carboniferous and permian strata. Its chief tributaries are the Rother, Dearne, and Went. It is navigable for the last 39 m. of its course below Sheffield, by the aid of artificial canals and cuts.

DO'NA, **SAN**, a t. of n. Italy, in the province of Venice, 18 m. n.e. from Venice, on the left bank of the Piave. Pop. of commune, 8500.

DONÑA AÑA, a co. in New Mexico, on the border of Texas and Mexico, intersected by the Rio Grande, and by several mountain ridges; about 8992 sq. m.; pop. '90, 9191. The productions are wheat, corn, wool, and live stock. Co. seat, Las Cruces.

DONA FRANCISCA, a German colony, situated in the province of Santa Catharina, Brazil, about 14 m. inland from the port of São Francisco, was founded about 1867, and its population is estimated at 6700. Chief town, Joinville or Dona San Francisca, with about 3000 inhabitants.

DONABUE, a t. of Pegu, stands on one of the main branches by which the Irrawaddy enters the bay of Bengal, lat. 17° 10' n., and long. 95° 27' e. It is within the delta of this grand artery of the country, and is situated 65 m. to the n.w. of Rangoon, and 54 to the n.e. of Bassein, the principal seaports of the newly acquired British province. It is only on historical grounds, however, that the place is worthy of notice. Here the English were repulsed with considerable loss in both the Burmese wars; first in 1825, and again in 1853.

DONAGHADEE', a seaport in the n. of the county of Down, on the Irish Channel, 18 m. English (14 Irish) e.n.e. of Belfast, and 22 m. s.w. of Portpatrick, Wigtownshire, with which it is connected by a submarine telegraph cable. It forms a crescent round the harbor, with two chief streets, one facing the sea, and is frequented for sea-bathing. Its exports are cattle, grain, potatoes, etc. It has a lighthouse which can be seen for twelve miles. Pop. '91, about 2000. On the n. of D. is a conical mound, 140 ft. high, 480 ft. in circuit at the base, and surmounted by a modern miniature castle 50 ft. high, whence there is a very extensive prospect, including the Scotch coast and the Isle of Man. The Danes, in 837, are said to have destroyed a university which stood on a level a little s. of where D. now is.

DONALDSON, **JAMES LOWRY**, b. Md., 1814; graduate of West Point; served in the Florida and the Mexican wars, and in the war between the states, in all with distinction, rose to be maj.-gen. in 1865, and in 1869 retired from active service. He wrote *Sergeant Atkins*, a tale of the Florida war. He d. in 1885.

DONALDSON, **JOHN WILLIAM**, was b. in London, June 7, 1811. His father, Stuart Donaldson, a wealthy merchant, was descended from an old Scotch family; his mother was daughter of J. Cundall, esq., of Snail Green, Lancashire. He was educated first at the university of London, and afterwards at Trinity college, Cambridge. He graduated as B.A. in the year 1834, and obtained the second place in the first class of the classical tripos. The year following he was elected fellow. His first work was a volume, entitled *The Theater of the Greeks*, partly original and partly compiled, which, having been carefully revised and improved in six successive editions, still holds its place as a school and college class-book. He was still resident at Cambridge, holding the office of assistant-tutor of Trinity, when he published the first edition of his *New Cratylus* (1839), a work remarkable for its research, erudition, and boldness, and as being the first attempt, on a large scale, to familiarize Englishmen with the principles of comparative philology, as established by the great scholars of Germany—Pott, Bopp, Grimm, and

others. Availing himself largely, but not servilely, of the labors of these men, he developed their principles, and continued their researches, with a special application to the history, structure, and etymology of the Greek language. The *New Cratylus*, in its latest, largest, and most improved form, is still the most important work which has been written in English upon the subject. Mr. D. soon after married the daughter of sir John Mortlock of Stapleford, and accepted the post of head-master of the grammar-school of Bury St. Edmunds, having previously taken holy orders. Notwithstanding the engrossing nature of his duties as head-master, he found time to prosecute and extend his linguistic studies, embracing in their wide range Hebrew and Arabic, and most of the dialects of modern Europe. In the *Varronianus*, of which the first edition appeared in 1844, he undertook to accomplish for Latin philology what in the *New Cratylus* he had done for Greek. He dedicated the work to the bishop of St. Davids (Dr. Thirlwall), in grateful recognition of the benefits derived from his Cambridge teaching. Among his other works of this period may be mentioned an edition of Pindar, of the *Antigone* of Sophocles (with a verse translation), *Maskil le Sopher* (a treatise on Hebrew grammar), and finally *Jashar*, a book written in Latin, and published at Berlin, the object of which was, by critical tests, to distinguish the fragments of the lost book of *Jashar* imbedded in the Pentateuch. This book was violently assailed by the so-called "religious press," which did not prevent its undaunted author from issuing a second edition.

Soon afterwards he resigned his place at Bury St. Edmunds, and returned to Cambridge, where he gave a course of lectures on Latin synonyms, and occupied himself with tuition. Here he wrote a volume entitled *Christian Orthodoxy*. Some critics vehemently disputed its right to the title. A smaller volume on classical scholarship followed. He had previously issued a *Greek Grammar* and a *Latin Grammar* for the use of schools. These, during his residence at Cambridge, he recast and enlarged, so as to rival in profundity and copiousness any other works on the same subjects. In 1856, he was appointed one of the classical examiners in the university of London, an honor which he owed chiefly to the strenuous report of Mr. Grote, the historian of Greece.

He was engaged in superintending the compilation of a new *Greek Lexicon*, when his health, for the first time, began to show symptoms of failure. A tour in Germany during the summer of 1860 did not produce any change for the better. Incipient disease of the brain, the result of overwork, showed itself first by neuralgic pains, and afterwards by more alarming symptoms. He removed to London, and died in his mother's house, after some weeks of great suffering, borne with calm and patient courage, on the 10th of Feb., 1861. In private life, he was distinguished by kindness of heart, ready wit, unfailing vivacity, and varied conversational powers. It ought, perhaps, to be mentioned that a little work, published anonymously under the title of *Phile-leutherus Anglicanus*, which made no small sensation at the time of its appearance, has been very generally attributed to Dr. Donaldson.

DONALDSON'S HOSPITAL, an extensive establishment at Edinburgh, of the character of Christ's hospital, London. Its founder was James Donaldson, a successful printer in Edinburgh, son of Alexander Donaldson, publisher, of whom some notice is taken in the articles **BOOK-TRADE** and **COPYRIGHT**.

DONATELLO (properly, DONATO DI BETTO BARDI), one of the restorers of the art of sculpture in Italy, was b. at Florence, in 1383. He belonged to the Donato family, which reckons several scholars among its members, and has given some doges to the republic of Venice. *Donatello* was a diminutive given to the artist in childhood. He received his earliest instructions from Lorenzo Bicci. His first great works in marble were the "St. Peter" and "St. Mark" in the church of St. Michael in his native city. His own favorite, however, was the statue of an old man in the garb of a senator, on the steeple of the same church. It is known under the name of *Zuccone* (the gourd or bald-head). He died at Florence, Dec. 13, 1466. D.'s principal works, besides those already mentioned, are a statue of "St. George" (in marble), "Judith bearing the Head of Holofernes" (in bronze), the "Crucifixion" (in wood), several statues of the "Baptist" (executed in various materials), and a grand equestrian statue (in bronze) of Erasmus Gattamelata, erected on one of the public places of Padua. He also executed a number of bas-reliefs. The whole tendency of D.'s genius was towards a reproduction of the antique; and his style, though not free from harshness and the rudeness of early art, sometimes reminds one of the glorious productions of ancient Greece.

DONA'TI, GIOVANNI BATTISTA, 1826-73; an Italian astronomer, professor in the royal institution at Florence. June 2, 1858, he discovered the comet now bearing his name. He discovered other comets, made spectroscopic observations, and published diagrams of lines in the spectra of the stars. In 1864, he was appointed director of the Florence observatory.

DONATION. In legal usage the word donation is confined to the transfer of personal property made without consideration; but the word gift is also used to denote a particular kind of transfer of real estate—that by which there is created an estate in *fee tail*, an estate, that is, which is granted to a man and certain particular heirs; the instrument by which such a transfer is made is called a deed of gift. Title to personal property can thus be acquired only through the voluntary, positive, and gratuitous act of the owner, followed by the distinct acceptance of the donee. The general classifica-

tion of gifts of personal property is twofold ; *donatio inter vivos* (a gift between the living) denotes the ordinary kind of gift, which goes into effect at once and has no reference to future events ; in this last particular it is distinguished from *donatio mortis causa* (a gift because of—that is, in expectation of—death). This last form of gift is usually intended to avoid the necessity of making a will when circumstances render that impossible or difficult ; only personal property can pass in this way ; the transfer must be made when the death of the donor appears imminent, there must be actual or constructive delivery of the property, and the gift takes effect only upon the death of the donor. The gift, therefore, is really a conditional one and may be revoked upon the death of the donor. A gift *inter vivos*, on the contrary, is absolute, and not revocable. All kinds of personal property are subject to these two forms of gift, including even a *chose in action*, that is, property of which the owner has not the actual possession but the right of possession, and which he may reduce to possession by legal action. Such a right, in case of its gift to another must be transferred by a duly executed written assignment. The only cases when a gift of personal property *inter vivos* is revocable are when they are prejudicial to the legal rights of creditors, when the donor is legally incapable of making the gift, or when the transaction is vitiated by fraud. The phrase *donatio propter nuptias* (a gift on account of marriage) was used in the civil or Roman law to designate the sum paid by a husband as the offset to the wife's dowry ; this was considered partly as jointure for the wife in case of her survival, partly as security for the return of the wife's dowry to her heirs if she survived her husband. It is a general rule of law that a donation is not to be presumed ; unless, that is, there is specific evidence to the contrary it will be assumed that the transfer of valuable property was made in expectation of a reasonable return ; thus the support of a child by a relative not his parent will render any estate which he may possess or come into liable for compensation ; and it has even been held that under special circumstances a father may maintain a claim for the expense of sustaining his child where the latter possesses a separate estate. The principles of the common law in regard to donations, as above briefly enunciated, are followed closely by the statutes and decisions of England and the United States. A special use of the word donation in this country is in the term *donation lands*, which were certain lands set apart by the state of Pennsylvania after the Revolution, in the northwest part of its territory, as a gift to its citizens who had served in the Revolutionary army.

DONATION OF CHARLEMAGNE was a gift made by Charlemagne to Pope Adrian I. in A.D. 774, of his conquests in Italy. It was also a confirmation of the Donation of Pepin (q.v.), but the extent and general conditions are not known.

DONATION OF CONSTANTINE was a forgery of uncertain date but probably published about 750 A.D., professing to be a gift in the year 324, of Rome and Italy from Constantine to Sylvester I., then Pope. The fraud was exposed by Laurentius Valla.

DONATION OF PEPIN is a term used to designate a gift made by Pepin, father of Charlemagne, to Pope Stephen in A.D. 755. Pepin was the first Frankish king whose election and consecration received the pope's sanction, and he also consecrated him anew in the church of St. Denis in Paris. In return for this Pepin was soon called upon to assist the pope in maintaining his temporal sovereignty. This he did by marching into Italy at the head of a large army against the Lombard king, Astolphus, whom he compelled to raise the siege of Rome, to abandon the city and exarchate of Ravenna, and also several cities that had formerly belonged to Greece, the keys of which he presented to the pope.

DONATI'S COMET, discovered June 2, 1858. It was nearest the earth Oct. 10, when its apparent length, 51,000,000 m., made it a sight of wonderful magnificence. Its distance in aphelion is estimated at 15 billions m., and its return to the solar system is not expected till the year 3808.

DONATISTS were the followers of Donatus, a Numidian bishop who opposed the election of Cecilianus in 311 A.D. to the bishopric of Carthage, on the ground of the ordination having been performed by one who had been a traditor, or traitor—that is, one who, during persecution, had given up the sacred books to the pagan authorities ; and also because Cecilianus had exhibited great hostility towards the victims of the late persecution. After some time, the council of Arles (Aug. 1, 314 A.D.) decided against Donatus, who in a short time seceded from the Catholic church, and formed a distinct sect, which, by 330, had 172 bishops in northern Africa. The D., like the followers of Novatian (q.v.), went upon the principle, that the essence of the true church consisted in the purity and holiness of all its members individually, and not merely in its apostolical and Catholic foundation and doctrine. They therefore both excommunicated all lapsed and gross offenders, not receiving them again but on being re-baptized, and also held that the efficacy of the sacraments depended on the worthiness of the administrator. Driven to fanaticism by the oppression of the secular power, they not only denied to the state all right to meddle with ecclesiastical affairs, but bands of Donatist ascetics collected, attacked the imperial troops (348), and continued to devastate Mauritania and Numidia for a dozen years. In the beginning of the 5th c., they seem to have almost

equaled the Catholics in number, and the eloquence of Augustine and these verities of Honorius were exercised upon the sect in vain; they continued to exist as a separate body. But by adopting a more prudent plan of proceeding, the Catholic bishops had, by the end of the 6th c., induced most of those that had left to return to the bosom of the church; and in the 7th c. the D. were extinct. Donatism is regarded by Neander (see *Dogmengeschichte*, translated into English by J. E. Ryland: Bohn, vol. ii. page 394) as a reaction against that form of Catholicism, "which conceived the church to be an outward organism, continued by the succession of bishops, who formed the necessary medium of communication with Christ, and for partaking in the Holy Spirit and salvation." "Whoever is shown to be a Christian in a right and lawful manner, is to me a Catholic," was a saying of the D.; while the church in general, guided by Augustine, wished to let the worthy and unworthy remain mixed together, and to defer the separation to the final judgment." Thus, while the D. had the merit of superior strictness of theory, it must be acknowledged that their views were less practical than those of their opponents.

DONATUS, ÆLIUS, a well-known grammarian and commentator, who taught grammar and rhetoric at Rome about 355 A.D., and was the instructor of St. Jerome. He wrote treatises, *De Literis; Syllabis; Pedibus et Tonis; De Octo Partibus Orationis*; and *De Barbarismo; Solecismo*, etc., the best edition of which is in Lindemann's *Corpus Grammaticorum Latinorum* (vol. i.). These writings form together a pretty complete course of Latin grammar, and in the middle ages were the only text-book used in the schools, so that Donat came, in the w. of Europe, to be synonymous with grammar, or with the elements of any science. The *Donat into Religion* is the title of a book by an English bishop, and there was an old French proverb, *Les diables estoient encore à leur Donat* (The devils were yet in their grammar). The Latin grammar of D. has formed the groundwork of the elementary treatises on that subject to the present day. D. was one of the first books on which the art of printing by means of letters cut on wooden blocks was tried, and copies of these Donatuses are reckoned among the greatest of bibliographical curiosities. The author also wrote a commentary on Terence, of which we possess only a part extending to five comedies, to be found in the edition of Terence by Klotz (2 vols., Leip. 1838).

From this D. we must distinguish a later grammarian, **TIBERIUS CLAUDIUS DONATUS**, from whom we have a very worthless life of Vergil, prefixed to many editions of that poet, and fragments of a commentary on the *Æneid*.

DO NAUWÖRTH, a t. of Bavaria, situated at the confluence of the Wernitz and the Danube, about 25 m. n.n.w. of Augsburg. It is well built, in the form of an amphitheater, round the side of a hill, and is surrounded by walls. It was formerly a free imperial city of considerable importance, but it has declined in population, which in 1890 was only 3733. It is historically interesting, however, as the main cause of the thirty years' war; the severity of the punishment meted out to the inhabitants in 1607, in consequence of their adoption of the reformed doctrines, and their assault on a Roman Catholic procession of the "Host," having led to the formation of the Protestant league, and Catholic union, the opponents in that long and severe struggle. It is likewise associated with the name of Marlborough, who stormed and carried the intrenched camp of the Bavarians here in 1704. Also, on the 6th Oct., 1805, the French, under Soult, obtained a victory here over the Austrians, under Mack.

DO NAX, a genus of lamellibranchiate mollusks, of the family *tellinidæ*, with shell of two equal valves, which close perfectly, and are of a triangular form, prettily striated from the beak to the margin, the beak occupying the obtuse angle of the triangle. The species of D. are generally small. Several are found on the British coasts. The fossil species are not numerous, and belong to the eocene formation.

DON BENITO, a t. of Spain, in the province of Badajoz, 55 m. e. of the city of that name. It is situated near the left bank of the Guadiana, and is in general well built, with wide and tolerably clean streets. It has several squares, the chief of which is lined with the principal structures in the town, including the town-hall, prison, and a convent; and in the center is a public promenade. D. B. has manufactures of woolens, wine, and oil, and its proximity to the Guadiana affords it great trading facilities. Pop. 1887, 16,287.

DON CARLOS. See **CARLOS**.

DONCASTER, a municipal borough in the West Riding of Yorkshire, on the right bank of the Don, on the Great North road, 35 m. s. of York. The country around is flat, but beautiful. Fine old elms line the broad and level road from the south. D. is very clean and well built. The High street is a mile long. It has manufactures of iron, brass, sacking, linen, and agricultural machines. Its corn-market is one of the largest in the kingdom. Pop. '91, 25,936. D. was the ancient *Danum*, and lay on the Roman road from York to Lincoln. Roman coins, urns, and a votive altar have been found here. It was the *Dona Castre* of the Saxons. The Saxon Northumbrian kings had a palace here. D. was burned by lightning in 759, and frequently ravished by the Danes. It has long been famous for its annual races, begun in 1703, and held a mile s.e. of the town in the second week of Sept. Col. St. Leger, in 1776, founded stakes

which have been yearly run for by the best horses in England. On an eminence 5 m. w.s.w. of D. are the ruins of Conisborough castle, a Norman-Saxon round tower, 37 ft. in diameter and 86 ft. high, with walls 15 ft. thick, strengthened by square buttresses reaching the whole height. The door is arrived at by an external flight of 37 steps, and within is a cylinder open to the heavens.

DON COSSACK, a government in Russia in Europe, n.e. of the sea of Azov, on the river Don; 61,886 sq. m.; pop. '95, 2,222,755. The country is generally level and sandy, and the climate mild, though in winter there are sometimes very cold and severe storms. Cattle-raising is the principal business; hemp and flax are raised, and wine, salt, and caviare are among the exports. Seat of government, Novo-Tcherkask.

DONDRA HEAD, the most southerly extremity of Ceylon, is in lat. 5° 55' n., and long. 80° 38' east. As compared with cape Comorin, the corresponding point in the peninsula of Hindustan, it more directly faces the Indian ocean, and lies nearer the grand thoroughfares of eastern commerce.

DONEGAL, a seaport in the s. of Donegal co., at the mouth of the Eske, on a shallow creek of Donegal bay, 11 m. n.n.e. of Ballyshannon. It lies in a rich alluvial tract, surrounded on three sides by hills, behind which rise lofty picturesque mountains. On the river is Donegal castle, formerly belonging to the O'Donnells of Tyrconnell. On the shore are the ruins of a Franciscan monastery, founded in 1474 by Hugh O'Donnell. Pop. '91, less than 1500.

DONEGAL, a maritime co. of Ireland, in Ulster province, bounded on the n. and w. by the Atlantic. It has a very extensive and much indented coast-line, off which lie numerous islands. The surface is, for the most part, mountainous, moory, and boggy, with many small lakes and rivers. Some hills exceed 2000 feet in height. It has several rivers, of which the Foyle is the largest. Lough Derg is the largest lake. The minerals are not of importance and the inhabitants are mainly occupied with agriculture. Formerly, owing to the number of inaccessible retreats and the abundance of turf-fuel, it was the chief seat of illicit distillation in Ireland. In the county are some of the most congested districts in Ireland, and to relieve the pressure of population on subsistence, a royal commission on public works in 1887 advised the construction of railways. Since that time railway lines have been greatly extended in the county. Linen and woolen manufactures are carried on, and the female population is largely engaged in the working of muslin. Many of the inhabitants on the coast are occupied in the fisheries. The fine scenery in the northern part of the county draws many tourists, and the county contains interesting memorials of St. Columba, and the famous St. Patrick's purgatory, situated on an island in Lough Derg (q. v.). The population since 1841 shows a continual decrease, being at that date 296,448, and in 1891, 185,635. It returns four members to Parliament.

DONELSON, ANDREW JACKSON, 1800-71, American politician, nephew of Andrew Jackson, graduated at the U. S. Military Academy, and served for some time afterward in Florida, but resigned in 1822, studied law and was admitted to the bar in the following year. On Jackson's election to the presidency he was his private secretary, and in 1844 was appointed *chargé d'affaires* to the republic of Texas, with which he negotiated a treaty of annexation. He was afterwards minister to Prussia and to Germany, and in 1856 was a candidate of the American party for the presidency, but was defeated, after which he retired to private life.

DON'ELSON, FORT, on Cumberland river, Tenn., 12 m. e. of Fort Henry. It was an important point in the war between the states, and was strongly held by the confederates until Feb., 1862, when the Union forces under Grant laid siege to it. Buckner, the confederate commander, asked for terms, to which Grant replied: "No terms except unconditional surrender will be accepted. I propose to move immediately upon your works." Before night the fort and 8000 prisoners were surrendered.

DONETZ', a river in s. Russia, a tributary of the Don. It is 673 m. long, and is chiefly in the country of the Don Cossacks. It is navigable to Zmiev.

DONGAN, THOMAS, Earl of Limerick, 1634-1715; b. Castletown, co. Kildare, Ireland. He served in the English and French armies with the rank of col., was appointed lieutenant-gov. of Tangier, 1678, and gov. of the province of New York, 1682. Being a Roman Cath. he was at first looked upon with suspicion by the colonists, but he showed himself champion of their interests, managed the relations between the English, French, and Indians with great sagacity, granted a charter to the city of Albany, 1686, which still remains the basis of its municipal rights, and refused to carry out the instructions of King James II. to introduce French priests among the Five Nations, on the ground that the measure was dangerous to English power on the continent. He was obliged to resign, 1688; returned to England, 1691; and succeeded to the title of Earl of Limerick by the death of his bro., 1698.

DONG-NAI' or **DONAI**, is the name of a river in Lower Cochin-China. It flows into the sea in the n.e. of the delta of the Mekong.

DONGOLA, the name of a province in Eastern Africa, traversed in its central part by the valley of the Nile. The Mamelukes took possession of the country in 1820, but it was regained for Egypt by Ibrahim pasha, and remained under Egyptian control till the Mahdist revolt in 1886, when it passed under the power of the rebels. After the revolt Egypt reoccupied the northern part of Dongola, but the country was not fully restored to Egyptian rule till 1896, when an army under the Sirdar made an expedition into that region. The Dervishes offered slight resistance, the town of Dongola was captured by the Egyptians on September 23rd, and the whole province was reannexed. The province comprises the towns of New Dongola (Dongola Marakah) and Old Dongola. The former is situated on the Nile, and is the capital of the province, having been built about the year 1820 around the administrative buildings erected there by the Egyptian government. It has a considerable trade and a government factory. The population is estimated at 10,000. Old D. is a ruined town on the right bank of the Nile about 75 miles s.s.e. of New D.

DONIPHAN, a co. in n.e. Kansas, on the Nebraska border and the Missouri river; crossed by the old California overland route; 378 sq.m.; pop. '90, 13,535. The surface is chiefly prairie, and the soil good. Co. seat, Troy.

DO NIS CONDITIONALIBUS, STATUTE DE, called also the statute of Westminster the Second, 13 Edw. I. c. 1, is the statute which first established in England the power of creating an entail (q.v.).

DONIZETTI, GAËTANO, composer, b. in Bergamo, Italy, Nov. 29, 1797; d. there April 8, 1848. He studied at the Naples Conservatorio under Simon Mayr, and began to write operas, which gave him a local reputation. In 1830 he produced *Anna Bolena* in Milan, which brought him universal fame. His first operas were imitations of Rossini, but in his late works the dramatic element was more conspicuous, and he seems to have overshadowed Verdi. Donizetti wrote more than sixty operas, including: *Enrico di Borgogna*, Venice (1818); *Elizabetta a Kenilworth*, Naples (1828); *L'elisire d'amore*, ib. (1829); *Anna Bolena*, Milan (1830); *Parisina*, Florence (1833); *Torquato Tasso*, Rome (1833); *Lucrezia Borgia*, Milan (1834); *Maria Stuarda*, Naples (1834); *Lucia di Lammermoor*, his masterpiece, ib. (1835); *Marino Faliero*, Paris (1835); *Belisario*, Venice (1836); *La fille du regiment*, Paris (1840); *La Favorita*, ib. (1840); *Linda di Chamounix*, Vienna (1842); and *Don Pasquale*, Paris (1843). He also wrote church, chamber, and pianoforte music. See Filippo Cicconetti, *Vita di G. Donizetti* (Rome, 1860). Much of Donizetti's work is mediocre and therefore doomed to oblivion, owing to the haste and carelessness with which he wrote. He was known to strike off the score of an opera in two days, and the last act of *Favorita* is said to have been written in a single night.

DON'JON, or **DUNGEON**, the principal tower or keep (q.v.) of a castle (q.v.) or fortress. It was so called either from being placed on a *dun* or elevation, natural or artificial, or because, from its position, it dominated (Lat. *dominio*, corrupted into *domgio*, *dongeo*) or commanded the other parts of the fortress. From the circumstance that the lower or under-ground story of the donjon was used as a prison, has come the modern meaning of the word. See CASTLE.

DON JUAN is a legendary and mythical personage like Dr. Faustus. The two have been made the representatives of two different tendencies, both proceeding from the same principle—from the principle, namely, of unbelief and godlessness, which necessarily turns self into either a god or a beast—the principle of subjectivism, or selfishness become dominant. In Faust, expression has been given to the subjective idealism of the Germanic nations, their tendency to subtle speculation and a rationalism antagonistic to faith.

Although Faust and D. J. have thus the same source and the same termination, yet, as they proceed from opposite poles, they stand in contrast to each other, and, as was natural, have found different vehicles of expression—Faust in poetry, D. J. in music. The ideal of the D. J. legend is presented in the life of a profligate who gives himself up so entirely to the gratification of sense, especially to the most powerful of all the impulses, that of love, that he acknowledges no higher consideration, and proceeds to murder the man that stands between him and his wish, fancying that in so doing he had annihilated his very existence. Partly in wanton daring, partly to allay all uneasy misgiving, he then challenges that spirit in which he disbelieves to demonstrate to him its existence in the only way he holds valid—namely, through the senses. When this actually happens, when the spirit proves its existence and power by animating the marble statue which he had, with daring mockery, invited as his guest, and summoning him to the final tribunal, compels him to acknowledge the supremacy of spirit, and the worthlessness of a merely sensuous, godless, and immoral existence, it is all over with him, he is crushed, and sinks into hell.

This ideal career is aptly enough localized in one of the most luxurious cities of the once world-monarchy of the Saracens—viz., Seville—and the characters wear the names of the ancient noble families of the place. The hero of the story, D. J., is described as

a member of the celebrated family Tenorio, and is represented as living sometimes contemporary with Peter the Cruel, sometimes with Charles V. The chief aim of his sinful career is the seduction of the daughter of a governor of Seville, or of a nobleman of the family of the Ulloas. Being opposed by the father, he stabs him in a duel. He then forces his way into the family tomb of the murdered man, within the convent of San Francisco, causes a feast to be prepared there, and invites the statue which had been erected to his victim to be his guest. The stone guest appears at table as invited, compels D. J. to follow him, and, the measure of his sins being full, delivers him over to hell. At a later period, the legend came to be mixed up with the story of a similar profligate, Juan de Maraña, who had in like manner sold himself to the devil, but was at last converted, and died as a penitent monk in the odor of sanctity.

The genuine legend of D. J. was first put into form by Gabriel Tellez (Tirso de Molina), in *El Burlador de Sevilla y Convivado de Piedra*. This drama was transplanted to the Italian stage about 1620, and soon found its way to Paris, where numerous versions of it, among others Molière's *Festin de Pierre* (1669), made their appearance. It was brought on the English stage by Shadwell under the title of *The Libertine* (1676). In the end of the 17th c., a new Spanish version of Tellez's play was prepared by Antonio de Zamora, and brought on the stage. It is this version that forms the groundwork of the later Italian versions and of Mozart's opera. It was first put into an operatic form by Vincenzo Righini in *Il Convitato di Pietra* (1777); the text of Mozart's *Don Giovanni* was written by Lorenza da Ponte (1787). Through this famous opera the story became popular all over Europe, and has since furnished a theme for numbers of poets, playwrights, and writers of romance. A. Dumas has a drama, *Don Juan de Maranna*; Byron's *Don Juan* follows the name, and in so far the character of the original; and Prosper Mérimée's novel, *Les Ames du Purgatoire, ou les Deux Don Juan*, is founded upon it.

DONKEY, a quadruped of the genus *Asinus*. Its name is thought by some to be derived from its *dun* color with the suffix *key* referring to its diminutive size. As this animal is particularly noted for its obstinacy, the name is often applied to an obstinate or wrongheaded fellow. For a general description of the animal, see Ass.

DONKEY ENGINE, a small steam-engine, used in factories and especially on ship-board, as auxiliary to a large engine, drawing its steam from the main engine, and employed for pumping water into the boiler, raising and lowering goods and heavy weights, working the ship's rigging, raising anchors, working the fire apparatus, and like purposes.

DONLEY, a co. in n.w. Texas; formed 1876; and organized in 1882; crossed by Salt Fork of Red river; 908 sq. m. Pop. '90, 1056. Co. seat, Clarendon.

DONNE, JOHN, D.D., the son of an eminent merchant, cadet of an ancient family in Wales, was b. in London in 1573. His parents were Catholics, and he was educated in that faith. At the age of 11, he went to Oxford, where he remained three years; thereafter, he removed to Cambridge. Although he greatly distinguished himself at these seats of learning, the faith of his parents prevented him from taking a degree. At the age of 17, he entered Lincoln's Inn, to read for the bar; and while so engaged, he carefully studied the principal points in dispute between Catholics and Protestants, and finally joined the latter. About this time, he wrote several of his minor poems, the erotic heat of which contrasted strangely with the austerity of his later years. In 1594, he went abroad, and lived for three years in Spain and Italy. On his return, he was made secretary to Lord Ellesmere, then lord keeper of the great seal. Here he fell in love with that nobleman's niece, and they were privately married. When the union was discovered, D. was imprisoned by his enraged father-in-law. After his liberation, he recovered his wife by legal process, and, without settled employment, went to reside at the house of sir Francis Wooley, a kinsman of his wife. After the death of sir Francis, he removed to London, and lived with sir Robert Drury, in Drury lane. With sir Robert he went to Paris; and on his return, at the instigation of James I., who was delighted with the *Pseudo-Martyr*, a book which D. had written against the Catholics, he entered holy orders. He was made D.D. by the university of Cambridge; and after accompanying an embassy to the queen of Bohemia, he was made on his return dean of St. Paul's, and vicar of St. Dunstan's. A fever carried him off in 1631. His life has been written by Izaak Walton—forming one of the group of "lives" so praised by Wordsworth in a celebrated sonnet.

D.'s works consist of satires, elegies, religious poems, complimentary verses, and epigrams: they were collected and published by his son in 1650. An earlier but imperfect collection appeared in 1633. D. is usually considered as the first of a series of poets of the 17th c., who, under the infelicitous name of the metaphysical poets, fill a conspicuous place in English literary history. The directness of thought, the naturalness of description, the rich abundance of genuine poetical feeling and imagery, now began to give way to cold and forced conceits, and elaborate exercises of the intellect. Yet it is generally acknowledged that, amid much rubbish, there is not a little real poetry, and that of a high order, in Donne. His fancy was rich and subtle, his wit singularly keen and poignant, and his word-painting such, that, if he had possessed, in addition, music and sensibility, he would probably have enjoyed a perpetual popularity.

DONNELLY, IGNATIUS, an American author, born in Philadelphia, 1831, where he was educated in the public schools, and, having studied law, was admitted to the bar. Removing to Minnesota in 1857, he was elected lieutenant-governor of the state in 1859 and again in 1861. He served as a republican member from Dec. 7, 1863, to March 3, 1869. Besides his journalistic work as the editor of an anti-monopolist newspaper from 1873 to 1878, he is the author of an *Essay on the Sonnets of Shakespeare*; of *Atlantis, the Antediluvian World*, 1882, in which he tried to prove the existence in ancient times of a large island in the ocean opposite the straits of Gibraltar, known to early writers as Atlantis; and in 1883, of *Ragnarok*, the object of which was to demonstrate that the deposits of clay, gravel, and decomposed rocks, characteristic of the drift age, were the result of contact between the earth and a comet. His work, *The Great Cryptogram* (1887), from its application of Bacon's word-cipher (mentioned in *De Augmentis*) to the first folio of Shakespeare's plays, and its alleged proof of Bacon's authorship of the Shakespearean drama, attracted considerable attention. His other works include *Cesar's Column* (1891), *The Golden Bottle* (1892), *The American People's Money* (1895), etc.

DON NYBROOK, or **ST. MARY'S OF DONNYBROOK**, a village and parish in Dublin co., Ireland; now included in Pembroke, a western suburb of Dublin. The parish contains the villages of Donnybrook, Irishtown, Merrion, Ringsend, and Sandymount. The village of Donnybrook was long noted for its fair (begun under king John), kept up for half the month of August every year. In later times the fair lasted only a week. It was long notorious as a season of debauchery and fighting, and in 1855 was finally abolished.

DONT, JACOB, violinist, b. in Vienna, March 2, 1815; d. there, Nov. 8, 1888. He studied the violin in the Conservatorium in Vienna, where he was professor of this instrument from 1873 until his death. As a solo and quartet player, he was much esteemed. He also published works of value for the violin.

DON QUIXOTE. See CERVANTES.

DOO, GEORGE THOMAS, one of the best English historical engravers of the present day, was b. in the parish of Christ Church, Surrey, Jan. 6, 1800. He was undoubtedly best known by his famous plate of "Knox Preaching before the Lords of the Covenant," after Wilkie; while his admirable rendering of Eastlake's "Italian Pilgrims coming in sight of Rome," his exquisitely finished heads of women and children, after Lawrence, his engravings from Raffaele, Correggio, and others, have succeeded in winning for him a very high place in the estimation of the admirers of his laborious art. In 1851, he was elected a fellow of the royal society, and, in 1856, a royal academician. He was appointed chairman of the engravings committee of the London international exhibition of 1862. In 1864, he completed, after eight years' work, a large engraving of the "Raising of Lazarus," by Sebastian del Piombo. He d. 1886.

DOOLY, a co. in s.w. Georgia, on Flint river; 705 sq.m.; pop. '90, 18,146, incl. colored. The land is fertile, but much of it is occupied by pine forests. The chief productions are corn, cotton, and molasses. Co. seat, Vienna.

DOOM or **DUM PALM** (*Hyphæne Thebaica*), a species of palm remarkable for the repeated forkings of its stem. It is a native of upper Egypt and of the central parts of Africa. In some districts, it is the most plentiful tree, sometimes even forming forests, sometimes growing amidst the very sands of the desert. Its leaves are fan-shaped. Ropes are made of the fiber of its leaf-stalks. Its fruit is about the size of an orange, but of a somewhat elongated irregular shape; the outer skin is red, and this being peeled off, a considerable thickness of a spongy dry substance is found within it—also part of the *pericarp*—which has an insipid sweetness, and a remarkable resemblance to gingerbread, so that the tree is sometimes called the GINGERBREAD-TREE. This substance is used as an article of food, and an infusion of it as a beverage. The infusion is cooling, gently aperient, and very salutary in fevers. The albumen of the seed is hard and semi-transparent, and is turned into beads and other little ornaments. Each fruit contains one seed.

DOOMSDAY BOOK. See DOMESDAY BOOK.

DOOMSTER. See DEEMSTER.

DOON, a Scotch river, rising in the s.e. of Ayrshire in Loch Enoch. It runs n.w. through Loch Doon (5 m. by $\frac{1}{2}$ m., amid treeless mountains), past Dalmellington, Burns's monument, and Alloway kirk, to the firth of Clyde, 2 m. s. of Ayr. It is 30 m. long. On leaving Loch Doon, the river flows through Glen Ness, a huge rocky and wooded ravine, not surpassed in picturesque beauty by any similar scenery in Scotland. On an islet in the loch are the ruins of Doon castle, where Edward, brother of Robert Bruce, is said to have lived. Burns has immortalized the D. in song.

DOOR and **DOORWAY**, in art. The form of the doorway is determined by the architectural style of the building in which it is placed. In classical buildings, it is generally rectangular in form, though both Greeks and Romans, following the Egyptians, amongst whom the practice was almost universal, occasionally diminished the opening towards the top; and the Romans, in later times, very frequently threw over it the circular arch, which was the characteristic feature of their style. Egyptian doorways are known to us, for the most part, only by the examples which remain in monumental structures; and these, like the other members of the style as thus exhibited, are of gigantic proportions. The doorway of the temple at Edfu measures 74 ft. to its summit, but the lintel and cornice which cover it are so deep and massy as to occupy a space of no less than

23 ft., so that the height of the aperture is only 51. With the Egyptians, the doorway was an architectural object of very great importance. On either side of it, colossal statues or obelisks were placed, and the approach to it was often lined with rows of gigantic sphinxes.

The Greek doorway was surrounded by moldings, and as the lintel or top-stone which covered it projected on both sides beyond the jambs, the moldings which ran round both jutted out at the place of meeting, forming a sort of shoulders, as in a doorway of Erechtheum. This arrangement, however, was by no means uniform, the moldings of the jambs being frequently quite separated from those of the architrave. The doors themselves, in antiquity, in private dwellings, were generally of wood; and in structures devoted to religious or public purposes, of metal, and occasionally of marble. They were generally paneled, and turned on pivots working in sockets. With the exception of the forms of the windows, and the tracery and foliage of the pillars, doorways are the most characteristic feature in all the styles of Gothic architecture. In the earliest, which we in this country are in the habit of calling Saxon, and which on the continent is commonly known as Romanic, they are of course very plain. There is seldom more than a few simple moldings, surrounding a semicircular arch, and in some of the earliest examples, the head of the opening is covered by two flat stones, leaning upon each other in the center, and their other ends being placed on the imposts, so as to form a triangle. In the Norman style, they become gradually more ornamental. The arch still continued in general to be semicircular, though there are a few instances of the segmental or horse-shoe arch. As the style advanced, the moldings and enrichments became more various. Of these, that which is most characteristic of the style is the zigzag molding. Circular or octagonal shafts were now frequently placed in the jambs, and these, too, were often ornamented with zigzag or spiral moldings, their capitals being enriched with foliage or grotesque heads or figures. The opening of the doorway often does not rise higher than the springing of the arch, and in this case it is generally flat, the semicircular space between it and the arch being frequently ornamented with a sculptured representation of some scriptural subject. The few Norman doors that exist are devoid of ornament, with the exception of projecting nails, and a simple iron scroll-work projecting from the hinge, and stretching to a greater or less extent over the door. As the doorway adheres strictly to the characteristics of the style, early English doorways of course generally terminate in pointed arches. In these the moldings are more numerous, the jambs contain a greater number of small shafts, some of which occasionally stand quite free, and on the whole the work is richer in form, and more finished in execution. The opening of the doorway is now frequently divided into two, either by a single shaft or a clustered column. In the decorated style, the doorways are not in general so deeply recessed as in the early English; and this circumstance takes from them in richness more than they gain in elegance by their greater height, and by the more delicate character of their ornamentation. In these, the moldings are commonly enriched with flowers or foliage, either in running patterns or placed separately at short intervals. Of these, the commonest are the ball-flower (q.v.), and a flower of four leaves, which often projects boldly, and produces a fine effect. The iron scroll-work on the doors resembles that in the former style, except that the terminations are more frequently worked into leaves or flowers. In other cases, the doors are paneled, and covered with characteristic tracery. In the perpendicular style, though the door continues to be arched, it is usually placed under a heavy square external molding. The doorway in this style loses much of the depth and richness which belongs to it in the earlier styles which we have been considering. Shafts are still used in the jambs, though not always, and they are generally small and few in number; the capitals of the jambs rarely possess the same richness of foliage, and frequently consist merely of plain moldings. One or more large hollows are often left in the jambs, forming small niches, which frequently contain statues. This latter characteristic seems to be peculiar to the perpendicular style. In the doorways, as well as in the windows of this style, the four-centered arch came into general use, but two-centered arches, and, in small doorways, ogrees, are frequently to be met with. The doors in the perpendicular style, when ornamented, are usually paneled, the upper parts being sometimes covered with tracery, but the fine iron scroll-work of the earlier styles had entirely disappeared.

DOOR, the movable panel by which the opening to an apartment, closet, or passage is closed. Doors are made of wood, iron, bronze, or stone. When moving horizontally on hinges, they are called *swing-doors*; when two such are used to close one opening, they are *folding-doors*. *Sliding-doors* are those which move on rollers, and may be pushed aside. A *jib-door* is one which is concealed as much as possible when shut. A *trap-door* is one which opens vertically over a horizontal opening, as a hole in a floor, etc. When a small door closes an opening cut in a larger one, it is usually called a *wicket*.

Doors are commonly made of wood, and these we shall first describe. The most simply made door is constructed of several boards joined together at their edges by a *rebate*, or a *plowed and tongued groove* (see CARPENTRY); these are held together by a transverse piece simply nailed to each board; this is called a *ledge*, and the door thus made, a *ledge-door*. These are commonly used for workshops, stabling, etc.;

but when durability and appearance are to be combined, a stout frame is first made, its parts joined together by mortise and tenon. See CARPENTRY. This frame has one or more openings—usually four—which are filled with thin pieces called *panels*, fitted into grooves plowed in the edges of the frame. The horizontal pieces of the frame are, according to their position, called the top-rail, bottom-rail, lock-rail, and frieze-rail. The lock-rail is that to which the lock is fixed, the frieze-rail intermediate between the middle and top-rail in large doors. The extreme vertical parts of the frame to which the rails are fixed are called *stiles*, and the intermediate vertical part, a *mounting*. Doors are named one, two, four, six, etc., paneled doors, and are further described by the kind of molding which surrounds the panel, and from the description of panel. The main object of framing, besides appearance, is to counteract the tendency of the wood to warp, by binding the different parts together with pieces having their fibers at right angles to each other.

In many old buildings, the outer, and even some inner doors are made of massive oaken planks, bound together with ornamental iron straps. Iron doors are chiefly used to intercept fire. For this purpose, they are best made of wrought iron, with double sides. Bronze doors are sometimes used for churches and other large buildings. They are usually ornamented with castings in high and low relief. Those of the baptistery of the cathedral of Florence, by Ghiberti, and the pantheon of Rome, are among the most celebrated examples. A few examples of marble doors exist, chiefly in cemeteries and some Belgian churches.

DOOR, a co. in n.e. Wisconsin, between Green bay and lake Michigan; 450 sq.m.; pop. '90, 15,682. Agriculture is the chief business. Co. seat, Sturgeon Bay.

DOORRA. See DURRA.

DOOR-KEEPER, in the senate and house of representatives of the federal congress, and in the corresponding bodies in state legislatures, an officer chosen by vote of the body who has general charge of the rooms. He announces messages from presidents, governors, or the co-ordinate legislative bodies; attends to the dispatch of documents, and assists the sergeant-at-arms in keeping order.

DOORN, in English, *thorn*, is a common name in s. Africa. It indicates various communes in the Cape Colony. It also designates two rivers, distinguished as *Great* and *Little*, both of them joining the Olifant, or Elephant, on the right, but the smaller from the s.e., and the larger from the north-east.

DOORN BOOM, *Acacia horrida*, the most common tree in the wastes of s. Africa. The name D. (*thorn-tree*), given to it by the Dutch colonists, and the botanical specific name, are due to the number and sharpness of its spines. It seldom much exceeds 30 ft. in height, but its timber is hard and tough, and is much used for house-carpentry, etc. See ACACIA.

DOOS'TEE, a river of Beloochistan, running s. through the entire country, and falling into the Arabian sea. It is about 900 m. long.

DOQUET, or **DOCKET** (from the same root as *dock*, to cut off or clip), a small piece of paper or parchment, containing a brief or summary of a large writing. All attestations or declarations annexed to written instruments are called doquets, more particularly those that are done by a notary. The notarial D. is said to be the most ancient example of fixed style in Europe; and though latterly appropriated to the instrument of sasine, it was formerly common to all solemn instruments. It consisted of a Latin attestation, holograph of the notary, annexed to the notarial instrument prepared by him. The name of the notary was set forth, and the authority mentioned, by which he had been appointed to be a notary. In the case of an instrument of sasine, it stated that he was personally present with the witnesses; that he saw, knew, heard, and noted the circumstances mentioned in the sasine; that he prepared the instrument, and the number of pages it contained. In addition to his subscription, the notary was formerly in use in Scotland to add his *signum*, which was a flourish of the pen, called a paraph or ruck. Latterly, he only subscribed the document on each page; and on the last page, opposite to the D., he added to his subscription the motto which he had assumed on his admission as a notary. The notarial D. of instruments of sasine was superseded by 8 and 9 Vict. c. 35, s. 5. See DOCKET.

DOR. See DUNG BEETLE.

DOR, or **MONT DOR** (often written less properly *Mont d'Or*), a chain of mountains in France comprised in the great group of the Auvergne (q.v.) mountains in the department of Puy-de-Dome. They are clearly of volcanic formation, and rise in the Puy-de-Sancy, which is the highest peak of central France, to the height of 6,190 feet.

DORA D'ISTRIA. See GHICA (HELENA).

DORAK, a t. of Persia, in the province of Khuzistan, situated on a marshy plain at the junction of the D. with the Jerrahi. It is surrounded by a mud-wall, and defended by a fort. By a canal which unites the D. with the river Karun, a considerable trade is carried on. Population estimated at from 6000 to 12,000.

DORAN, JOHN, PH.D., a copious contributor to miscellaneous literature, descended from an old Irish family of Drogheda, was b. in London in 1807. In early life he resided in France and Germany, and was chiefly educated by his father. So early as 1822, he produced the melodrama of *The Wandering Jew*, and at the age of 20 became the editor of the *Literary Chronicle*. In 1835, he wrote a history of Reading, but from that time till 1854, he confined his labors to the periodical press. In the latter year he published *Habits and Men*, followed by *Table Traits and Something on them*. *Lives of the Queens of England of the House of Hanover* appeared in 1855; *Knights and their Days*, in 1856; *Monarchs retired from Business*, in 1857; *History of Court Fools*, in 1858; *New Pictures and Old Panels*, in 1859; *The Princes of Wales*, in 1860; and a *Memoir of Queen Adelaide*, in 1861. In 1864, he produced *Their Majesties' Servants*, a history of the stage from Betterton to Kean; in 1868, *Saints and Sinners*; and in 1873, his most interesting work, an account of Mrs. Montague and the "blue stockings" of her day, under the title of *A Lady of Last Century*. In 1876, he published *Mann and Manners*, the letters of sir Horace Mann to Horace Walpole. His last work, *London in Jacobite Times*, appeared in 1877. Besides being a large contributor to miscellaneous literature, Dr. D. several times edited the *Athenæum*, and at his death, 25th Jan., 1878, he was editor of *Notes and Queries*.

DORCAS SOCIETY, the name given to an association of ladies who supply clothes to necessitous families. The name is taken from Acts ix. 39: "And all the widows stood by him weeping, and shewing the coats and garments which Dorcas made, while she was with them."

DORCHESTER, a co. in s.e. Maryland, on Chesapeake bay, intersected by the Philadelphia, Wilmington and Baltimore railroad; 610 sq. m.; pop. '90, 24,843, inclu. colored. Productions, wheat, corn, etc. Co. seat, Cambridge.

DORCHESTER, a co. in Quebec, Canada, bordering on Maine, and drained in part by Chaudière river. Pop. '91, 19,042. Co. seat, St. Henedine.

DORCHESTER, DANIEL, D.D., b. Massachusetts, 1827; educated at Wesleyan univ., Conn.; Meth. Epis. clergyman since 1847, and a presiding elder for three terms of four years each; member of Conn. state senate, 1854, and chairman of commissioners on idiocy, 1854-55; member of Mass. house of representatives, 1882; historiographer of N. E. Methodist Historical soc. 1881-85; pres. of national league (non-sectarian) for suppression of liquor traffic, 1885. Among his published works are: *Concessions of Liberalists to Orthodoxy* (1878); *Problems of Religious Progress* (1881); *Giving and Worship* (1882); *The Liquor Problem in All Ages* (1884). He has high standing as a religious statistician.

DORCHESTER, a municipal, and till 1885 a parliamentary borough, the co. town of Dorsetshire. It has a considerable trade in ale and beer, and sends much butter to London. Pop. '91, 7946. D. was the Roman *Durnovaria* or *Durinum*, a walled town with a fosse, and a chief Roman British station. Parts of the wall, 6 ft. thick, remained till 1802. Near D. are the remains of the most perfect Roman amphitheater in England, 218 by 163 ft., and 30 ft. deep, the seats rising from the arena, cut in the chalk, and capable of holding 13,000 spectators. There is also a Roman camp with a ditch and high vallum. Near D. is a large British station with three earthen ramparts, a mile and a half in circuit, and pierced by intricate passages, and inclosing barrows. The inner rampart is 60 ft. high. Here, in 1685, judge Jeffreys, in his "bloody assize," sentenced to death, in two days, 109 persons implicated in Monmouth's rebellion.

DORCHESTER, was formerly a town in Norfolk co., Mass., but since 1870 a ward of the city of Boston; pop. '90, 18,048. The locality was settled by Puritans from Dorchester, Eng., under the lead of the Rev. John White, who landed at Nantasket, June 11, 1630. The codfishery, so important to New England, originated in Dorchester, and there was erected the first mill in America driven by water-power. Large portions of this district are exceedingly attractive, with beautiful suburban residences.

DORDOGNE, a river rising in s. central France, running w. through the departments of Corrèze, Lot, and Dordogne, and falling into the Garonne, 13 m. n. of Bordeaux; about 260 m. long, and navigable for 150 miles.

DORDOGNE, a department in the s.w. of France, formed of the ancient province of Périgord, with small portions of Limousin, Angoumois, and Saintonge. Area, 3,546 sq. m. Pop. '96, 464,822. The surface is for the most part hilly, and covered with broom and underwood, with here and there a valley of extraordinary beauty and fertility, inclosed with hills, the sides of which are generally clothed with vineyards. There is a great deficiency of corn, but the want, as an article of food for the inhabitants, is supplied to some extent by the immense produce of the chestnuts.

DORDRECHT. See DORT.

DORÉ, PAUL GUSTAVE, a French artist of great and versatile power, was b. at Strasbourg in 1832. He was educated at Paris, and very early gave indication of superior ability. His first attempts were sketches, contributed to the *Journal pour Rire* and others of the Paris periodicals. In 1855, he exhibited his picture of the "Battle of the

Alma," which was followed by the "Battle of Inkerman" in 1857. In this year he first became heard of in England by the reissue of his illustrations of the legend of the "Wandering Jew," the power of weird and grotesque imagination displayed in which could not fail to arrest attention. The success of this work might seem to have determined the future career of the artist, who afterward chiefly worked as an illustrator. His productiveness in this field is amazing. Doré illustrated editions of *Rabelais*, of the *Contes Drolatiques* of De Balzac, of Dante's *Divina Commedia*, of *Don Quixote*, of Lafontaine's *Fables*, of Milton, and of the Bible—all of which bear the impress of his original genius. Besides these, he illustrated Tennyson's works, Coleridge's *Ancient Mariner*, the *Atala* of F. Chateaubriand, and a tour in Valencia, besides executing a vast mass of miscellaneous work. Doré from time to time reproduced and exhibited in Paris and London many of his designs. The "Doré Gallery," used for this purpose, was a resort in London for several years. "Christ leaving the Prætorium" is his most important painting. The slightest of D.'s productions shows that he is at once artist and poet, and excites a greater interest than many works more free from hastiness and mannerism. In 1861, D. received the decoration of the legion of honor. He had some reputation as a sculptor. He d. 1883.

DORIA, ANDREA, a noble Genoese, and one of the greatest admirals of his age, was b. at Oneglia in 1468. At an early age, he took service in the guard of the pope, Innocent VIII., and afterwards distinguished himself in the battles which the Milanese and the French fought against Genoa and the kings of Aragon. It was D. who, in 1503, after a short campaign, crushed the rebellion in Corsica. When Genoa, in 1513, got rid of the French domination, D. was appointed capt.gen. of the galleys, in which capacity he carried on a war of extermination against the dangerous swarms of African pirates who infested the Mediterranean. During the war between Francis I., king of France, and Charles V., emperor of Germany, and king of Spain, D. commanded the French fleet, reinforced by his own galleys, and inflicted everywhere severe losses upon the enemy. After the defeat of Francis I. near Pavia, D. accepted the command of the papal fleet; but upon the return of the king from his captivity, entered once more the French service, with the title of high-admiral of the Levant. He blockaded Genoa, for having espoused the cause of the emperor, and putting to flight the party of the Adorni, took the town. On finding the independence of his country threatened by the French, D. with his whole force went over to the emperor, and by so doing hastened the deliverance of Italy from French domination. In 1529, D. entered Genoa without resistance, and refusing the title of sovereign, which was offered by the emperor, established there a popular form of government, which remained in vigor up to the end of the republic. The grateful country decreed him the title of "Father of Peace;" and the emperor, in whose service D. continued, conferred upon him the order of the golden fleece, together with the principality of Melfi. In 1532, D. won a decisive victory over the Turks near Patras, and the conquest of Tunis (1535) was chiefly his work. He took part in the joint expedition against the Turks under Barbarossa in 1539, and in another against Algiers in 1541, where he lost 11 of his own galleys. The tranquillity of his last years was disturbed by the conspiracy of Fieschi. D. took fierce revenge upon the conspirators for the death of his nephew Gianettino. D. died without offspring, in 1560, at Genoa, in his 93d year.

DORIANS, one of the four principal peoples of Greece, who took their name, according to the legend, from Dorus, the son of Hellen, who settled in Doris; but Herodotus says that in the time of king Deucalion they inhabited the district Phthiotis; and in the time of Dorus, the son of Hellen, the country called Histiaëotis, at the foot of Ossa and Olympus. But the statement of Apollodorus is more probable, according to which they would appear to have occupied the whole country along the northern shore of the Corinthian gulf. Indeed, Doris proper was far too small and insignificant a district to furnish a sufficient number of men for a victorious invasion of the Peloponnesus. In this remarkable achievement they were conjoined with the Heracleidæ, and ruled in Sparta. Doric colonies were then founded in Italy, Sicily, and Asia Minor. Strikingly as all the four nations of Greece differed from each other in language, manners, and form of government, the D. in particular differed from the Ionians. The former preserved a certain primitive solidity and earnestness, but with it something coarse and hard. See O. Müller's *Die Doriër* (2 vols., Breslau, 1824; 2d ed. 3 vols, 1844). The *Doric dialect* bore the same character; it was harsh and rough, while the Ionian was soft and polished, yet the former had something venerable from its antiquity, and was therefore employed in hymns and choruses. In philosophy, the influence of the Doric character was particularly visible in the Pythagorean school and its attachment to the aristocracy. It is no less traceable in architecture in the strong unadorned Doric pillars, which form so marked a contrast to the slender and decorated Ionian columns.

DORIC ORDER. The oldest, strongest, and simplest of the three orders of Greek architecture. See COLUMN; ENTABLATURE; GRECIAN ARCHITECTURE.

DORIS, a genus of gasteropodous mollusks of the order *nudibranchiata*, the type of a family called *dorida*, and sometimes popularly SEA-LEMONS. The body is oval, the abdomen flat, the back flat in some and elevated in others, the mouth a small proboscis with two small tentacula, the vent situated in the back, and surrounded by a

circle of branched or plumed gills. The species are found in all seas, many in those of Britain; but they are more numerous in the southern hemisphere. Some of them attain a considerable size. Few of them inhabit deep water. They crawl on rocks, sea-weeds, etc., where they are often left by the tide, or swim in a reversed position; the foot, made concave by muscular action, serving to buoy them up. Some of them are pretty and interesting inmates of the aquarium. Gosse mentions, that specimens of *D. bilamellata* were "very social in confinement, continually finding out one another, and crawling close up together."—*A Naturalist's Rambles on the Devonshire Coast*.

DORIS, a small mountainous district of ancient Hellas, between Phocis, Ætolia, Locris, and Thessalia, was the earliest home of the Dorians. With its four towns, Boium, Cytinium, Erineus, and Pindus, it formed the Doric Tetrapolis, which was afterwards completely destroyed by the Macedonians, Ætolians, and other nations, so that at the time of the Romans, only a few remains of these towns were visible.—D. was also the name of a district in Asia Minor, on the coasts of Caria, inhabited by colonists from the Peloponnesus; it formed a *hexapolis*.—In modern Greece, D. forms an eparchy of the government of Phocis.

DORKING, or **DARKING**, a t. in England, in the middle of Surrey, stands in a picturesque valley on the left bank of the Mole, 23 m. s.w. of London by road. It lies on the Roman road which ran between London and Chichester. Pop. '91, 7132. Its chief trade is in flour, lime, and chalk from the adjacent pits. D. gives its name to a peculiar breed of domestic fowl.

DORMANT (Fr. sleeping). In heraldic representation, an animal dormant has its head resting on its forepaws, whereas an animal couchant has its head erect.

DORMANT VITALITY is a term used to designate a peculiar condition which is manifested by many organized beings, and which is characterized by an apparent suspension of all the vital actions. Beings in this state can scarcely be said to be *alive*, since they exhibit no vital activity, nor can they be designated as *dead*, since that implies their incapability of resuming their former state; hence, since they retain their peculiar attributes without manifesting them, the term D. V. seems the most appropriate for them. This condition may result either from the withdrawal of the stimuli necessary for the maintenance of vital actions (as water, heat, etc.), or it may proceed from some change in the organism itself, whereby its power of responding to these stimuli is for a time diminished or lost. We shall illustrate our meaning by a few striking examples of each kind of dormant vitality.

1. D. V. from the withdrawal of the necessary stimuli.

Seeds deprived of access to air and moisture may retain their vitality for an enormous time. "I have now before me," says Dr. Lindley, "three plants of raspberries which have been raised in the gardens of the horticultural society, from seeds taken from the stomach of a man whose skeleton was found 30 ft. below the surface of the earth, at the bottom of a barrow that was opened near Dorchester. He had been buried with some coins of the emperor Hadrian, and it is probable, therefore, that the seeds were 1600 or 1700 years old." A more remarkable illustration of the vitality of seeds is afforded by a case communicated to Dr. Carpenter, and published in his *General and Comparative Physiology* the facts of which may be shortly stated as follows: In a town in the state of Maine, about 40 m. from the sea, a well was being dug, and at a depth of about 20 ft. a stratum of sand was found, which excited interest, from the circumstance that no similar sand was known to exist nearer than the sea-beach. It was, in the first instance, collected in a heap, but was subsequently scattered about the spot on which the heap had stood. In a year or two, when the very existence of the sand was almost forgotten, it was observed that a large number of small trees were growing up on the ground where it had been strewed. They turned out to be beach plum-trees, and they actually bore the beach-plum, which had never before been seen except immediately upon the sea-shore. These trees had therefore sprung up from seeds which were in the stratum of sea-sand that had been pierced by the well-diggers, and had probably retained their vitality through a period of time beyond the estimation of human calculation—the period, namely, in which the sea had gradually receded 40 m. from its present limits.

Among the lower animals, we find several of comparatively complex structure, in which D. V. can be induced for a considerable period, as, for instance, several years by the abstraction of their *moisture*. The well-known rotifer, the wheel-animalcule, may be reduced to a state of perfect dryness, and kept in this condition for a great length of time (certainly three or four years, and some writers say far longer) without evincing a sign of life, and yet it will immediately revive on being moistened. The *tardigrades*, an allied tribe, have been desiccated by the most powerful means which chemistry affords, and have been then heated to a temperature of 250°, and have still been revived by water, although in their active state a temperature of 120° destroys them. In Woodward's *Manual of the Mollusca*, cases are recorded of living snails crawling out of shells which were supposed to be empty, and in which they must have been dormant for several years, and the eggs of snails and others of the lower animals have a still greater power of revivification after drying. Sir James Emerson Tennent describes various fishes in Ceylon which bury themselves in the mud when the pools or tanks dry up, and remain torpid until the periodic rains of that country ensue, and previous observers

had noted similar facts in other tropical countries. Humboldt relates that crocodiles and boas are sometimes found alive, though torpid, in hardened mud, and revive on the application of water.

A *diminution of temperature* will induce this phenomenon in many animals. In one of capt. sir James Ross's voyages, several caterpillars having been exposed to a temperature of 40° below zero, froze so completely that, when thrown in a tumbler, they chinked like lumps of ice. When thawed, they resumed their movements, took food, and became transformed into the chrysalis state. One of them, which had been frozen and thawed four times, subsequently became a moth. In the North American lakes, frozen fishes are often found in the ice, which revive when gently thawed. Spallanzani kept frogs and snakes in a torpid state for three years in an ice-house, and then revived them by warmth. The same capability does not exist, at all events to the same extent, in the warm-blooded animals. A *total suspension of vital activity* in a bird or a mammal for any length of time, from the prolonged application of severe cold, or from any other cause, is never followed by recovery. The stories of certain birds burying themselves in the mud during winter, are regarded by the best authorities as more than questionable; and in hibernating mammals (see HIBERNATION), the suspension is not total. How we are to explain, or whether we ought to believe, the remarkable cases of certain Indian fakirs, who are stated to have the power of suspending all their vital activity for days, or even weeks, we do not know. The late Mr. Braid, of Manchester, published a collection of these cases, directly obtained from British officers who had been eyewitnesses of them in India, in his *Observations on Trance or Human Hibernation*, 1850. We quote one of these, vouched for by sir Claude Wade. The fakir was buried in an underground cell, under strict guardianship, for *six weeks*; the body had been twice dug up by Runjeet Singh (at whose court the exhibition came off) during the period of interment, and had been found in the same position as when first buried. In this and in all the other recorded cases, the appearance of the body when first disinterred is described as quite corpse-like, and no pulsation could be detected at the heart or in the arteries. The means of restoration employed were chiefly warmth to the vertex, and friction to the body and limbs.

2. Dormant vitality from changes within the organism.

The insect world affords us the chief illustrations of this variety of dormant vitality. The pupa or chrysalis stage of insect life is in itself one of dormant vitality, unconnected with any of the external influences which we have been describing. That this stage may be much shortened by artificial heat, and prolonged by artificial cold, has been known since the time of Reaumur; but, as the following case shows, there are other causes inherent in the animal itself, which tend at a certain time to prolong the pupa condition. In the *papilio machaon* there are two generations every year; for the butterfly that comes forth in the early summer lays eggs which rapidly pass through all the phases of insect life, and produce another set of eggs later in the season, whose *larvæ* or caterpillars turn into *pupæ* before the winter. The pupa stage of the first brood (in July) lasts only 13 days, while that of the second brood (which commences in Sept.) lasts 9 or 10 months, the butterfly not appearing until the following June. The difference of temperature is obviously quite insufficient to account for the great diversity between the two periods. Several other similar cases may be found in Kirby and Spence's *Entomology*.

DORMER, or **DORMER WINDOW**, is a window placed in a small gable rising out of a sloping roof, often made use of for the purpose of enlarging and lighting the attic or garret-rooms of modern houses. It is also popularly known as a storm-window. *Dormers* do not appear to have been invented before the middle of the 14th century.

DORMITORY (Fr. *dormitoire*, from Lat. *dormire*, to sleep), a sleeping apartment in a monastery, or other religious establishment. Dormitories are usually of considerable size, sometimes having a range of cells parted off on each side.

DORMOUSE, *Myoxis*, a genus of rodent quadrupeds, ranked by some naturalists in the family *muride* (rats, mice, etc.), and by others in the family *sciuride* (squirrels, etc.); being, in fact, a connecting link between the one family and the other. Their habits resemble those of squirrels; the dentition, however, more nearly agrees with that of mice. There are four molar teeth on each side in each jaw: the upper jaw has not the anterior rudimentary fifth molar, characteristic of squirrels. The molars have their summits marked by transverse ridges. There are no cheek-pouches. The ears resemble those of mice. The fore-paws have each 4 toes and a rudimentary thumb; the hind-feet have 5 toes. The fur is very fine and soft. The tail is long, and in the different species exhibits characters variously intermediate between those of mice and squirrels. This genus and the closely allied genus *graphyurus* are remarkable as the only genera of rodents in which there is no cæcum. The species of *D.* are beautiful little animals, natives chiefly of the s. of Europe. Some species are also found in Africa, and the genus *graphyurus* is entirely African. The only British species of *D.* is the **COMMON D.**, **RED D.**, or **MUSCARDINE** (*M. acellanarius*), an inhabitant of woods in some parts of England. It is about the size of a common mouse, with head proportionally large; has a rather pointed muzzle, large prominent eyes, and a flattened tail, thickly clothed with rather long hair; and is of a tawny red color on the upper parts, and white beneath.

It is extremely gentle and easily tamed, feeds on beechmast, acorns, hazel-nuts, grain, etc., and spends the colder parts of winter in a state of torpidity, although in mild weather it wakens up to consume a little of the store of food which, like squirrels, it lays up for that season. Before its hibernation begins, it is generally very fat, nor does it become emaciated by hibernating. It makes a nest of tangled or interlaced herbage opening from above, usually in copse or underwood; and produces about 4 young ones at a birth. It often assumes a remarkable posture in feeding, suspending itself by its hind-feet; more generally it sits upon its haunches, and holds its food in its fore-paws. This species is found in all parts of continental Europe, from the Mediterranean to Sweden.—The FAT D. (*M. glis*) is a larger species, grayish brown, about the size of a rat, with tail very like that of a squirrel, a native of the s. of Europe, where it inhabits forests, leaping from branch to branch with great agility. It is eaten by the Italians, as it was by the ancient Romans, who highly esteemed it, and fattened it for the table in receptacles called *gliraria*.—The GARDEN D. (*M. nitela*), common in Europe as far n. as Poland, is frequently found in gardens, and even in outhouses. It is often very destructive of the fruit of wall and espalier trees. It is rather smaller than the fat D., grayish brown, black round the eyes, and has the tail tufted only at the extremity. All the species of *D.* hibernate; and from this circumstance the name seems to be derived (Lat. *dormio*, to sleep).

DORNBIERN, a t. of Austria, in the n.w. of Tyrol, about 8 m. s. of the eastern extremity of the lake of Constance, is situated on the Lossen, a small mountain stream. The houses are widely scattered. The women of *D.* are chiefly employed in muslin-embroidery; the men are for the most part carpenters, and are principally engaged in the construction of wooden houses, which are carried in detached pieces to the market-town (Bregenz), and are thence exported. Pop. '90, 10,678.

DORNER, ISAAC AUGUST, D.D., b. Württemberg, 1809; son of a Lutheran minister; studied at Tübingen, and a professor there in 1838. Soon afterwards he was professor of divinity and counselor of the consistory at Königsberg. From 1847 to 1853, he held a chair at Bonn, then removed to Göttingen; and in 1862, was appointed professor of systematic theology and exegesis in the university of Berlin. His best known work is the *History of the Development of the Doctrine of the Personality of Christ*. Others, translations of which have been published, are: *Christliche Glaubenslehre*, 2 vols., 1880; *Gesammelte Schriften aus dem Gebiet der Systematischen Theologie*; and *Exegese und Geschichte*. He d. at Wiesbaden, 1884. Uniting great learning and deep thinking, he was a strong upholder of evangelical Christianity as opposed to German rationalism. On a few points, mostly eschatology, his views have been criticized as divergent from the prevalent theology.

DORNICK, **DORNIC**, **DORNOCK**, a species of figured linen, for a full description of which see Ure's *Dict. of Arts and Manufactures*. Dornicks were formerly made in considerable quantity at Dornich, or Tournay, in the Netherlands, and hence their name. From this place, the manufacture was probably carried to Norfolk by the Dutch, who emigrated thither during the persecution of the duke of Alva. By a statute, 5 and 6 Ed. VI. c. 24, this manufacture, or "mystery," carried on at Norwich, is carefully protected. All persons except those residing in Norwich or Pulham, are forbidden to carry on the "mystery," under pain of forfeiture of the article, and of the sum of 6s. 8d. for every six yards so made. By 4 Will. and Mary, c. 5, s. 2 (68), a duty of 10 per cent, in addition to duties previously levied, is laid on all tapestry or dornicks imported, except from France. It is scarcely necessary to add, that these stringent provisions are no longer in observance.

DORNOCH, a royal burgh and co. t. of Sutherlandshire, situated near the entrance to the DORNOCH FIRTH—an inlet of the North sea, running 25 m. inland, and separating Sutherland from Ross-shire. The cathedral stands in the center of the town, and is an object of considerable attraction. It is said to have been begun in the 11th c. by St. Bar, and was enlarged in 1270 by bishop Gilbert Murray. It was burned in 1570, and thereafter partially repaired. In the year 1837, it was to a certain extent restored by the late duchess of Sutherland. It is in the shape of a cross, and is surmounted with a tower and clock spire. The interior is fitted up and used as the parish church. *D.* was, in olden times, the residence of the bishops of Sutherland and Caithness. The west tower of the bishop's palace stands immediately opposite to the cathedral.

DOROG, or **HAJDU-DOROG**, a t. of Hungary, 20 m. n.n.w. from Debreczin, situated in the midst of a very fertile district. The pop., about 8,700 in number, are chiefly engaged in agricultural pursuits.

DOROGOBUSSH, or **DOROGOBOUGE**, a t. of Russia, in the government of Smolensk, is situated on the left bank of the Dnieper, about 50 m. e.n.e. of Smolensk. It is a small town, but pretty, and well built, and has some manufactures. Pop. about 8500. At *D.*, the French under Eugène, in their retreat from Moscow, encountered many disasters.

DORP, a former town in Prussia, in the government of Düsseldorf, 17 m. n.e. of Cologne; population, 1885, 13,285. In January, 1889, it was united with Solingen.

DORPAT, or **DERPT** (Russian, *Yuriev*, its official name; Esthonian, *Tartolin*), a t. of Russia, in the government of Livonia, is situated on the Embach, here crossed by a fine granite bridge, 150 m. n.e. of Riga, and is built in the form of a semicircle. It consists of a town proper, with two suburbs. Its streets are straight and clean; its houses, which are mostly of one story, are built of brick or wood, have handsome fronts, and are often showily painted. It is the winter residence of the Livonian nobles and gentry. The Domberg hill, at the n.w. extremity of the town, is tastefully laid out in avenues and promenades; its summit, formerly the site of a cathedral, destroyed by fire in 1775, is now occupied by an observatory, the university library, schools of anatomy and natural history, museums, etc. The observatory—one of the most renowned in Europe, and long presided over by the celebrated Struve—possesses a great refracting telescope, presented by the emperor Alexander I. The university, founded in 1632 by Gustavus Adolphus, suppressed in 1656 by the Muscovites, and re-established by Alexander I. in 1802, is also famous. It supports a large staff of 70 professors and lecturers, and is well attended. It had the privilege of self-government till 1889, when it was deprived of it by the Russian government. It was also required to use the Russian language in instruction. It is also the chief school of the Protestant clergy in Russia, and the Reformed synod of Wilna send their students hither. D. has a well-known botanical garden. D. was formerly a walled town, and the ramparts still exist, but have been converted into public walks. Pop. est. (1892) 34,897.

DORR, JULIA CAROLINE RIPLEY, b. South Carolina, 1829; was educated in the North, her father having settled in Rutland, Vt., where she was married, 1847. She has published a number of novels, *Laumerc*, *Sibyl Huntington*, *Expiation*, etc.; several volumes of poems, *Vermont*, *Friar Anselmo*, *Afternoon Songs*, *Poems*, etc.; and has been a frequent contributor to periodicals. Her later works include, *Periwinkle* (1893), *The Flower of England's Face* (1895), *A Cathedral Pilgrimage* (1896), etc.

DORR, THOMAS WILSON, 1805-54; b. R. I.; graduate of Harvard, 1823. He was the leader of a party in 1840-41 whose object was to extend the right of suffrage in Rhode Island, it being much restricted by property qualifications, and otherwise. This party framed a new constitution, which was voted on, Dec., 1841, when it was claimed that a clear majority of the male citizens of the state voted for its adoption. In April, 1842, an election for state officers under this constitution was held, and Dorr was chosen governor. In May the new government undertook to organize and assume full power. They were resisted by the regular state government, and made some show of using force, but there was no actual fighting. Before the close of the month the Dorr-ites were scattered, and their leader was arrested, tried for treason, and sentenced to imprisonment for life, June 25, 1844. In 1847, he was released under an act of general amnesty, and in 1851, was restored to civil and political rights.

DORRE ISLAND, lying to the north of Dirk-Hartog island in lat. 25° 10' s., forms, like its southern neighbor, part of the breastwork of Shark Bay, in western Australia.

DORR'S REBELLION. See DORR, THOMAS WILSON.

D'ORSAY, ALFRED GUILLAUME GABRIEL, Count, 1798-1852; a famous leader of society in London and Paris, who was not only the beau ideal of social elegance, but a man of universal intellectual and artistic gifts. Through his mother, by a morganatic marriage, he was a grandson of the king of Würtemberg. When young he served in the French army, and in 1822, while stationed at Valence, on the Rhone, he made the acquaintance of the earl of Blessington and his family, an event which affected the course of his after life. In Dec., 1827, he married lady Harriet Gardner, 15 years of age, the daughter of the earl of Blessington by his first wife. The union was not happy and was dissolved soon after Blessington's death in 1829. The widowed countess was accompanied to England by D'Orsay, and the two lived in the same house, their residence becoming a resort of the fashionable artistic and literary society of London. The count's charming manner, brilliant wit, and artistic faculty were accompanied by benevolent moral qualities which endeared him to all his associates. He was always a Bonapartist, and naturally hastened to Paris in 1849, all the more readily because his home in London had been broken up through bankruptcy. The countess went with him, but died a few weeks after their arrival. He then endeavored to support himself by painting portraits. Only a few before days his death he was appointed director of fine arts.

DORSE (*Gadus callarias*, or *Morrhua callarias*), a fish of the same genus with the cod, haddock, etc.; plentiful in the Baltic and in other northern seas, but scarcely known on the coasts of Britain. It never attains so great a size as the cod, being seldom more than 2 ft. in length, but much resembles it in form and color, although its color is more variable, from which it has received the name of VARIABLE COD. It is also called the BALTIC COD. It differs from the cod in the greater length of the upper jaw. It is in great request on the coasts of the Baltic.

DORSET, EARL OF. See SACKVILLE.

DORSETSHIRE, or **DORSET**, a maritime co. in the s. of England, on the English channel, between Devonshire and Hampshire. Its greatest length is 58 m.; greatest breadth, 40; average, 21; area, 627,265 acres; a third being arable, a ninth waste, and the rest in pasture. The coast-line is 75 m. long, with some cliffs and headlands. St. Alban's Head is 344 ft. high. Portland isle (q. v.) is connected with the mainland by a remarkable formation known as Chesil bank. The surface is uneven and bleak. Chalk downs run along the s. coast, and through the middle of the county nearly from e. to w. The highest point is Pilsdesden Pen, 934 feet. The chief rivers are the Stour and the Frome. Geologically, D. consists of strata of plastic clay, chalk, oolite, lias, with some weald and greensand. Remains of colossal reptiles have been found at Lyme Regis. Pop. '81, 190,979; '91, 194,487.

DORSEY, JAMES OWEN, American anthropologist, was b. in Baltimore, Md., Oct. 31, 1848; was ordained in 1871, and did missionary work among the Indians. From 1878 until his death in 1895, he continued researches in ethnology and linguistics for the Bureau of Ethnology. Among his works are *Omaha Sociology and The Dhegiha Language, Myths, Stories and Letters*; published by the Bureau of Ethnology.

DORSEY, SARAH ANNE, 1829-79; b. Natchez, Miss.; d. New Orleans; daughter of Thos. G. Ellis. She was a student of Sanskrit, and of the Aryan philosophy; and published the novels, *Athalie*, *Lucia Dare*, *Agnes Graham*, and *Panola*. She was widely known for her charities. Mrs. D., who as a slaveholder was attentive to the comfort and religious culture of her slaves, was a warm friend of Jefferson Davis; and left by bequest to his family such estate as the fortunes of the war had spared to her.

DORSEY, STEPHEN W., b. Vt., 1842; received an academic education; served in the civil war; was elected U. S. senator as a republican from Ark., 1872. He was implicated in the "Star Route" scandals, but was acquitted, 1882. He was an efficient worker and leader in the presidential campaign of 1880.

DORSHEIMER, WILLIAM, b. Lyons, Wayne co., N. Y., 1832. He studied at Phillips academy, Andover, and Harvard coll.; practiced law in New York; was U. S. attorney, Northern District of New York, 1867; lieut.-gov. of N. Y., 1874-80; representative from New York in XLVIIIth and XLIXth congresses. He died 1888.

DORSIBRANCHIATES, worms living in mud or sand, or swimming in the sea, whose respiratory organs are in the form of tufts or branchial appendages along the back or sides. One species, the lob-worm, is greatly prized in Europe for fish bait. The eunice, another species, has been known to reach the length of 4 feet.

DORSTENIA. See *CONTRAYERVA*.

DORT, or **DORDRECHT**, a t. of the Netherlands, in the province of South Holland, situated on an island formed by the Maas, about 12 m. s.e. of Rotterdam. An inundation in 1421, in which upwards of 70 villages were destroyed and 100,000 people drowned, separated the site upon which D. stands from the mainland. D. is fortified on the s. side, and its position is naturally so strong, that though frequently besieged, it has never been taken. It is one of the oldest towns in Holland, and some interesting historical particulars attach to it. Here, in 1572, the states of Holland, after their revolt from Spain, held their first assembly, and declared the prince of Orange to be the only lawful governor of the country. In 1618-19, the conclave of Protestant divines known as the synod of Dort, met here and condemned the doctrines of Arminius as heretical, and affirmed those of Calvin. (For an account of the questions at issue, see *ARMINIUS*.) The Gothic buildings in which the synod sat, whose miraculous labors, according to the president's closing address, "made hell tremble," is now used as a public-house, and the particular room in which they met is degraded into a dancing-saloon. Among the principal buildings of D. are a Gothic church with a tall square tower, and containing a beautiful marble pulpit, and the town-hall. The town is traversed by canals, and the Rhine and the Maas afford it great facilities for trade. Large ships can go quite up to the quays. Gigantic wood-rafts, valuing sometimes as much as \$150,000 each, obtained from the Black Forest and Switzerland, come down the Rhine to D., which has numerous saw-mills, ship-building docks, salt and sugar refineries, bleacheries, and manufactures of tobacco, white-lead, etc. It has also considerable trade in corn, flax, oil, timber, and salt fish. Pop., Dec. 31, 1895, 36,089.

DORTMUND, the most important t. of Westphalia, on the Cologne and Minden railway, is situated on the Emscher, 47 m. n.e. of Cologne. It is the center of a mining district, with numerous foundries, and the head-quarters of the mining authorities of Westphalia. D. was formerly surrounded by massive walls, but the greater part of these have been removed, and the town is now quite modern in its aspect. Its history goes back into the earliest middle-age traditions, figuring in the time of Charlemagne under the names of Throtmanni, Tremonia, Trotmunde, and Dortmunde. Subsequently it became a free Hanse town, but was ceded to Prussia in 1815, at the congress of Vienna. The town-hall of D. is one of the oldest in Germany. D. is an important railway center, and manufactures railway material on a large scale. Coal and iron are wrought in the neighborhood; and in D. are a great number of beer-breweries. Pop. '95, 111,235.

DORY, *Zeus*, a genus of fishes, the type of a family, *zeidae*, which is sometimes regarded as merely a group of the great family of *scomberidae*, but is at least a very distinct group, characterized not only by an oval and much compressed form of body, but also by a protractile mouth. The teeth are feeble. The species of *zeidae* are distributed in the seas of all parts of the world (see **BOAR-FISH** and **ОРАН**). In the *D.* genus, the general surface of the body is smooth and destitute of scales, but spiny scales or bony shields guard the dorsal and ventral edges. The anterior portions of the dorsal and anal fins are spiny, and are very distinctly separated from the spineless portions; the spines of the dorsal fin are prolonged into long filaments, and the tail-fin is rounded. The British species (*zeus faber*), popularly known as the **JOHN DORY**, sometimes attains a considerable size. It is principally found on the southern, and particularly the south-western coasts of England, visiting them apparently in pursuit of pilchards; but becomes more rare towards the north. The name *D.* is generally supposed to be properly *dorée* (gilt), and to refer to the prevailing yellowish color and golden luster of the fish; whilst the familiar appellation, *John*, is in like manner derived from *jaune* (yellow). The *D.* has a remarkable dark spot in each side. An idle legend refers these spots to the finger and thumb of St. Peter, and the *D.* thus disputes with the haddock the honor of being reputed the fish from whose mouth he took the tribute-money. Other species of *D.*, very similar to the European, are found in the seas of other parts of the world—one of them Australian, exhibiting similar dark spots.

DOSITHEANS, named after their founder Dositheus, who was a companion of Simon Magus, in the 1st c. A.D. Various stories are told of Dositheus; that he claimed to be the Messiah, and that after the death of John the Baptist, he assumed to take the place of that leader. The Samaritan high-priest ordered his arrest, when he took refuge in a cave, and is said to have starved to death.

DOSTOIEVSKI, FEDOR MIKHAILOVITCH, a Russian novelist, was born in Moscow in 1822. His first book was *Poor People*, published in 1846. Condemned to death for his liberal tendencies in 1849, his punishment was commuted to banishment to Siberia, and he was subsequently pardoned. In 1861 *The Downtrodden and the Oppressed* appeared, and in 1867 *Evil Hearts and Crime and Punishment*. He started in 1876 *An Author's Journal*. His other works include *The Idiot* (1869) and *Podrostok* (1875). He died universally lamented by educated Russians, Feb. 9, 1881.

DO'TIS, or **TOTIS**, a t. in the n. w. of Hungary, district of **Komorn**, and 37 m. w.n.w. of Pesth. Between the town proper and its suburb, called *Lake Town*, from its situation on a small lake, are the remains of an old castle, said to have been a favorite residence of Mathias Corvinus, the Hungarian king. *D.* contains a splendid château, the property of the Esterházy family. The city has sulphur springs, and in the neighborhood are valuable marble quarries. Pop. about 10,000.

DOTTEREL, *Charadrius morinellus*, a species of plover (q. v.), which in summer inhabits the northern parts of Europe and Asia, breeding chiefly in the highest latitudes, and migrates on the approach of winter to the countries around the Mediterranean and those of similar climate. It appears in Britain as a bird of passage, both on its northward migration in spring, and on its southward migration in autumn. Some breed in the mountains both of Scotland and England, always at very considerable elevations. The *D.* is about nine inches and a half in its whole length. In summer plumage, the upper parts are of a brownish ash color, the feathers edged with deep red; the cheeks, throat, and a band above the eyes, white; the breast, bright rust color, with a white gorget on the upper part of it, bounded above by a blackish line; a conspicuous black patch on the middle of the belly; some of the tail-feathers tipped with white. The *D.* has become proverbial for stupidity; but the readiness with which it allows itself to be approached seems to be entirely owing to its coming from regions little frequented by man, and it becomes shy and watchful after a little experience. It is much esteemed for the table, and well known in the London market.

DOUAI, or **DOUAY**, a t. of France, in the department of Nord, situated on the river Scarpe, about 20 m. s. of Lille. It is a dull, lifeless place, but is surrounded with walls, and is strongly fortified. The principal buildings are the churches, the Hôtel de Ville, the public library, the museum, a hospital, and the old buildings of the English college. It contains several good schools and an arsenal. Among the manufacturing establishments are salt and sugar refineries, breweries, and file factories, and there is an active trade in corn, seed, and linen. Pop. '96, 31,397. *D.* has existed since Roman times. It was long a bone of contention between the Flemish counts and the French rulers. It passed with the rest of Flanders under the dominion of Spain, but was taken by Louis XIV. in 1667. Marlborough captured it in 1710, but the French re-occupied it after his withdrawal, and were finally confirmed in the possession of it by the peace of Utrecht. —The *English Catholic College* at *D.*, long the sole or chief theological seminary for English-speaking Catholics, was founded by Dr. William (afterwards Cardinal) Allen in 1568. By reason of political difficulties with the Spanish authorities, then in possession of the town, the college was transferred to Rheims in 1578; but in 1593, it was again established at *D.*, and there it flourished till the French revolution, when it was broken up. Subsequently it was re-established on a smaller scale by the Benedictine fathers, and is still conducted by them.

DOUAY BIBLE. See BIBLE.

DOUAY, FÉLIX CHARLES, 1816-79; a native of France; served as a capt in the siege of Rome in 1849, and in the Crimean war, where he rose to brig.-gen. He was in Mexico with Maximilian, serving as gen. of division. In the Franco-German war he led the 7th army corps, and was taken prisoner at Sedan. In Paris he led the 4th army corps against the commune. He was the first to enter Paris, May 21, and saved the Louvre from entire destruction.

DOUBLE-BASS, the largest stringed instrument played with the bow. The double-bass is the foundation of the orchestra, for to it is given the lowest part of the harmony. It probably received its name because it often doubles in the lower octave the bass of the harmony given to the bassoon, violoncello, or some other instrument. Only in the beginning of the 19th century independent parts were assigned to this instrument. Whether it was invented before the violin is unknown. Its origin is attributed to Gaspar di Salo in 1580, but he may have only added improvements to an instrument that already existed. The double-bass was first used in the orchestra about 1696. It was originally mounted with three strings, but is now used with four strings tuned in E, A, D, and G, and the notes sound an octave lower than written. The double-bass is an orchestral rather than solo instrument, but a few persons have excelled as virtuosi upon it, i. e., Dragonetti (1755-1846) and Bottesini (1822-89).

DOUBLEDAY, ABNER, b. N. Y., 1819; graduate of West Point, and a civil engineer. In the Mexican war he served in the artillery, and became capt. It is said that he fired the first gun on the union side in the war of the secession, at Fort Sumter, April 12, 1861. He rose to be maj.-gen. of volunteers; retired, 1873. He d. in 1893.

DOUBLE CONSCIOUSNESS. Double or divided consciousness has likewise been designated double personality. The term comprehends a group of morbid mental conditions involving some modification in the clearness of the idea of personal identity. Individuals are often encountered with confused notions of the "me" and "not me," others conceive that parts or properties of their frame belong to another person, or that they are inhabited and ruled by a spirit or entity acting in opposition to their will and interests; and there are others who, at different times and under different circumstances, such as when influenced by, or free from moral or physical stimulation, conceive that they are different persons, and endowed with different qualities and powers. These manifestations, however, do not fully illustrate the state under consideration, which has been described as exhibiting, in some measure, two separate and independent trains of thought, and two independent mental capabilities in the same individual, each train of thought and each capability being wholly dis severed from the other, and the two states in which they respectively predominate, subject to frequent interchanges and alterations. In the most marked or perfect form of this phenomenon, the individual is conscious of the two independent trains of thought, and conceives, in consequence of the apparent independence of these, that he is two distinct persons at the same time. There are few instances of this mental affection on record (see Wigan *On Duality of Mind*, Abercrombie's *Inquiry into Intellectual Powers*, Ellicot in Combe's *System of Phrenology*, 3d edition). A servant-girl, at the period of puberty, gave evidence of double personality for three months. In an advanced stage of the affection, the circumstances which occurred during the paroxysm were completely forgotten by her when it was over, but were perfectly remembered during subsequent paroxysms. She was, for example, taken to church while in her abnormal state. She shed tears during the sermon, particularly during an account given of the execution of three young men, who had described, in their dying declarations, the dangerous steps with which their career of vice and infamy commenced. When she returned home, she recovered in a quarter of an hour, was quite amazed at the questions put to her about the sermon, and denied that she had been in church; but next night, when taken ill, she mentioned that she had been there, repeated the words of the text, and gave an accurate account of the tragical narrative of the three criminals by which her feelings had been so powerfully affected (*Philosophical Transactions*, Edin. 1822). This description assimilates the patient to the class of somnambulists. But such perversions of the faculties generally involve a more palpable and complete duality of mind. The personal identity seems to be lost or impaired. A. B. conceived that he was himself and another person at the same time; he acted as if this belief were sincere, and could not divest himself of the conviction that in his body were two minds or persons suggesting courses of conduct widely opposed. He was certain that his original self, A. B., was a base, abandoned scoundrel, tempting his other, or new, or better self—to whom, it should be noted, was attached the emphatic *Ego*—to commit crimes or acts of which he altogether disapproved. The second person in this duality repelled, struggled with these abominable solicitations, such as that he should commit suicide; and loathed the tempter or first person. This struggle sometimes became real and visible, when the hands, acting under the will of No. 2, or the virtuous and opposing principle, beat and bruised the legs, body, or head, which, it may be presumed, were supposed to belong to No. 1, the vicious or tempting impulse. The object of the one was obviously to inflict pain upon the other. The blows were so severe as to leave marks for days; and when these were adverted to, the answer was, as if from No. 2, "Don't justify him, he deserved it." Such conflicts generally occurred during the night, and the interference of the night-watch was required to part or pacify

the combatants. In this case the manifestations of disease might be attributed to the abstruse inquiries of the mind during health. See CEREBRATION, UNCONSCIOUS.

DOUBLE COUNTERPOINT. See COUNTERPOINT.

DOUBLE ENTENDRE (*double meaning*), an expression capable of being taken in two senses, one of which is often questionable, while the other is innocent.

DOUBLE ENTRY. See BOOK-KEEPING.

DOUBLE FLAT, a musical character used to lower the note before which it is placed two half-tones.

DOUBLE FLOWERS. See FLOWER.

DOUBLE FUGUE. See FUGUE.

DOUBLE REFRACTION. If a crystal of pure carbonate of lime, known as Iceland spar, be laid over a printed page, two distinct views of the letters will be seen through the transparent stone. The letters in the two images will have a fainter color than the original, except when the two images overlap. The production of two images in this manner is called double refraction. If the crystal is made to rotate while always in contact with the paper, one of the images of a dot will be seen to rotate, while one remains unmoved. The stationary image is called the ordinary, the moving one the extraordinary image. The rays which form the ordinary image follow the common law of refraction of light. The others have a different index of refraction. Other crystals besides Iceland spar are doubly refractive. For an elaborate demonstration of the causes of this effect, see Lloyd's *Wave Theory of Light*, London, 1873.

DOUBLE SHARP, a musical character the reverse of the double flat.

DOUBLE STARS. As seen by the naked eye all stars appear to be single, but the telescope shows us that many are double, while it resolves others into several distinct bodies. In some instances telescopes of low power suffice to reveal the separation; others require instruments of the largest kind and very delicate adjustment. The object-glass especially needs to be free from all defects. Sometimes one of the components of a double star may hide another from view, and in other instances, while they are apparently near, they may yet be far from each other in almost the same line of sight. In certain cases, Herschel found that one of the components described an orbit about the other. A star which is single to ordinary vision, but which may be resolved into two stars thus physically related, is called a binary star. The components of the same star are almost invariably of a different color. The colors of some double stars, however, are complementary, producing together white light. Eight of the stars known to be physically double have periods of revolution less than a century, while about 400 appear to have a period of more than 1000 years for this process.

DOUBLE-STOPPING, the simultaneous sounding of two notes on a stringed instrument. The playing of double-stops is one of the most difficult tasks in the technique of the violin.

DOUB'LET (so called from being originally lined or wadded for defense) was a close, tight-fitting garment, the skirts reaching a little below the girdle. It was almost identical with the jerkin. The sleeves were sometimes separate, and tied on at the arm.

DOUBLET, a counterfeit gem composed of two pieces of crystal with a layer of color between them, giving the effect of a genuine colored stone. A species of lapidary counterfeiting practiced in early times as at the present day.

DOUBLING THE CUBE was a celebrated geometrical problem among the ancients. The object was to find the side of a cube whose content should be twice that of another given cube; and various accounts are given of how the problem was suggested. One legend brings the matter into connection with Delos (hence the name of "the Delian problem"), and relates that the oracle of Apollo in that island, being consulted by the inhabitants during the prevalence of a pestilence, gave for answer, that they should make the altar of Apollo, which was in the form of a cube, as large again. This was done, and yet the pestilence continued; and the oracle being again consulted, replied, that the altar must retain its cubic form, which had not been attended to in the enlargement. This problem perplexed the Delians, as it did mathematicians of after-ages. Even Plato, whom they consulted on the difficulty, could give them no solution, and had recourse, according to the story, to evasion.

The problem, however, is older than Plato; before his time, it had occupied Hippocrates of Chios (not the physician Hippocrates), and was studied afterwards by Eratosthenes, Nicomedes, Hero, and others. Apollonius applied conic sections to the solution of the question, as did also Menæchmus; Nicomedes invented a curve, which he called the conchoid, for the express purpose, and Diocles the cissoid. The analytical method introduced into geometry by Descartes showed this problem in its true light. It was seen to be only a special case of the solution of a cubic equation—a solution which is impossible by geometry, i.e., by the use of the circle and straight line. It may, however, be represented by the intersection of two conic sections, of which one may be a circle. Descartes made use of the parabola with the circle, which is the simplest way. With numbers, the question is merely one of the extraction of the cube

root. If the side of a cube be one foot, its solid content is $1 \times 1 \times 1 = 1$ cubic foot. The side of a cube of double that content, or 2 cubic feet, is $\sqrt[3]{2} = 1.259,921$.

DOUBLOON (Sp. *dublone*, double) is the name of a gold piece coined in Spain and Spanish America. The dublon de Isabella, coined since 1848, is of 100 reals, and equivalent to 25.84 French francs, or \$5.00. The older Spanish doubloons vary in value from 85 to 81 francs.

DOUBS, a department of France, on the eastern frontier, separated from Switzerland by the Jura mountains, is situated in lat. $46^{\circ} 35'$ to $47^{\circ} 31'$ n., and long. $5^{\circ} 42'$ to $7^{\circ} 4'$ east. Area about 2018 sq. miles. Pop. '96, 302,046. D. is traversed by the river Doubs, a tributary of the Saone, and is separated, on the n.w., from the department of Haute Saone by the Oignon, also a tributary of the Saone. The surface is hilly, being crossed by four parallel ranges of the Jura mountains. The climate is more rigorous than in most similar latitudes. The pine and the walnut attain a huge size, and the common orchard trees thrive well. Mines of iron and coal are worked, and gypsum and marble are abundant. The trade is principally in iron, cattle, horses, and dairy produce. D. is divided into the four arrondissements of Besançon, Baume-les-Dames, Montbelliard, and Pontarlier. The capital of D. is Besançon.

DOUCHE. See BATH and HYDROPATHY.

DOUGH is the name given to the moistened and kneaded flour in the first stage of making bread (q.v.).

DOUGHERTY, a co. in s.w. Georgia, on Flint river; 312 sq.m.; pop. '90, 12,206. It is level and fertile, producing corn, oats, cotton, etc. Co. seat, Albany.

DOUGHFACES, a contemptuous nickname applied to the northern abettors of negro slavery. It has been suggested that the name was derived from an appreciation of the kneadable character of dough. "J. R. Lowell explains the term in his *Catalogue Raisonné* as meaning, 'A contented lickspittle, a common variety of Northern politicians,' and alludes to it again in the lines,

Each hon'able *doughface* gets jest wnt he axes,
An' the people—thur annual soff sodder and taxes.

—*Biglow Papers*, I, p. 51.

"It is said that John Randolph, of Roanoke, in denouncing the famous Missouri Compromise as a 'dirty bargain,' also branded the eighteen northern congressmen, who helped to displace Mason and Dixon's line, as *doughfaces*, and that the epithet at once passed into the slang dictionary of politics." (De Vere's *Americanisms*, p. 280.)

DOUGHNUTS are cakes compounded of flour, sugar, etc., raised with yeast, and fried in hot lard. Crullers, which are made in a similar manner, but without the addition of yeast, are frequently and incorrectly called doughnuts.

DOUGLAS, a co. in Colorado, n.e. of the centre; 840 sq.m.; pop. '90, 3006. The bottom lands are fertile; other parts are more adapted to grazing. Coal and iron are found. Productions chiefly agricultural. Co. seat, Castle Rock.

DOUGLAS, a co. in n.w. Georgia, formed after the census of 1870. It is on the Chattahoochee river, and has an area of about 178 sq. miles. Cotton and corn are the chief productions, and minerals are found. Co. seat, Douglasville. Pop. '90, 7794.

DOUGLAS, a co. in e. Illinois, on Kaskaskia and Embarras rivers; 410 sq.m.; pop. '90, 17,669. It has a level surface and fertile soil, producing corn, oats, wheat, wool, and butter. Co. seat, Tuscola.

DOUGLAS, a co. in e. Kansas, on the Kansas river; 469 sq.m.; pop. '90, 23,961. It is of rolling upland, with a black loamy soil, producing corn, wheat, butter, etc. Co. seat, Lawrence.

DOUGLAS, a co. in w. Minnesota; 720 sq.m.; pop. 1890, 14,606. The surface is mostly level, and there are many small lakes. Productions agricultural. Co. seat, Alexandria.

DOUGLAS, a co. in s. Missouri, on the upper waters of the White river; 792 sq.m.; pop. '90, 14,111. The surface is hilly, much of it still covered with forests. Lead ore is found. The productions are chiefly agricultural. Co. seat, Ava.

DOUGLAS, a co. in e. Nebraska, on the Missouri river, bounded on the w. by the Platte; 330 sq.m.; pop. '90, 158,008. The soil is fertile, and the surface an undulating prairie. Productions agricultural. Co. seat, Omaha.

DOUGLAS, a co. in w. Nevada, on the California border; 892 sq.m.; pop. '90, 1551. It is a rough region, but embraces the most fertile portion of the Carson valley. There are pine forests in the mountains, and water-power is abundant. Gold, silver, and copper are found, but mining is not prosecuted to any great extent. Productions agricultural. Co. seat, Genoa.

DOUGLAS, a co. in s. Oregon, on the Umpqua river; 4875 sq.m.; pop. '90, 11,864. Productions, wheat, corn, barley, butter, wool, etc. Co. seat, Roseburg.

DOUGLAS, a co. in southern S. Dakota, formed in 1873; drained by branches of the Dakota river; 450 sq. m.; pop. '90, 4400. Co. seat, Armour.

DOUGLAS, a co. in the e. central part of Washington; formed, 1883, from Stevens co., and mainly bounded by the Columbia r.; about 4552 sq. m.; pop. '90, 3161. The soil is adapted to farming and stock raising. Co. seat, Waterville.

DOUGLAS, a co. in n.w. Wisconsin, on lake Superior and the Minnesota border; 1336 sq. m.; pop. '90, 13,468. Agriculture is the principal business. Co. seat, Superior.

DOUGLAS, the largest t. and principal seaport of the Isle of Man, is so called from its being situated near the junction of two streams—the *Dhoo* (black) and *Glass* (gray). D. lies on the margin of a highly picturesque bay, on the e. side of the island. From the excellence of the sea-bathing, and its central position, it is fast increasing in importance as a watering-place. The old town, standing on the south-western edge of the bay, consists of narrow, tortuous streets, and presents a vivid contrast to the handsome modern terraces and villas which occupy the rising ground beyond. A landing pier 1500 feet in length makes it unnecessary for passengers to land in small boats, as they formerly were obliged to do. There is also another pier 520 feet long, with a lighthouse at the end. Conspicuous in the center of the crescent of the bay stands castle Mona, formerly the residence of John, duke of Athol, but now converted into a first-class hotel. The tower of refuge, a picturesque object, occupies a dangerous rock, in the southern area of the bay, called Conister, and was erected in 1833 for the safety of shipwrecked mariners, by the late sir William Hillary, bart., who, during his residence at D., founded the royal national lifeboat institution. D. is the principal packet station of the island, and possesses telegraphic communication with England. Pop. '91, 19,515.

DOUGLAS, THE FAMILY OF. Archæology has failed in its efforts to pierce the obscurity which veils the origin of the heroic race of which it has been said:

So many, so good as of Douglas blood have been,
Of one surname, in one kingrick, never yet were seen.

A legend of the 16th or 17th c. told how, about the year 770, a Scottish king, whose ranks had been broken by the fierce onset of a lord of the isles, saw the tide of battle suddenly turned by an unknown chief; how, when the victory was won, the monarch asked where was his deliverer; how the answer ran in Erse, *Sholto Du-glas* ("Behold that dark-gray man"); and how the warrior was rewarded with that Clydesdale valley which, taking from him its name of Douglas, gave surname to his descendants. This fable has long ceased to be believed. Equal discredit has fallen on the theory which, 60 years ago, the laborious Chalmers advanced in his *Caledonia*, that the Douglasses sprang from a Fleming of the name of Theobald, who, between the years 1147 and 1164, had a grant of lands on the Douglas water from the abbot of Kelso. There is no trace of any connection between the Flemish Theobald and the Douglasses; nor were the lands which he acquired on one side of the stream any part of their old domain on the other. What was boasted of the Douglasses by their historian, two centuries ago, therefore still holds true: "We do not know them in the fountain, but in the stream; not in the root, but in the stem; for we know not who was the first mean man that did by his virtue raise himself above the vulgar." It was thought likely, in the beginning of the 15th c., that the Douglasses and the Murrays had come of the same stock, and in this old conjecture all that is known on the subject must still be summed up.

1. *William of Douglas*, the first of the family who appears in record, was so-called, doubtless, from the wild pastoral dale which he possessed. He is found witnessing charters by the king and the bishop of Glasgow between 1175 and 1213. He was either the brother or the brother-in-law of sir Freskin of Murray, and had six sons, of whom Archibald, or Erkenbald, was his heir; and Brice, a monk of Kelso, rose to be prior of Lesmahago (a dependency of Kelso, on the outskirts of Douglasdale), and in 1203 was preferred to the great bishopric of Murray. He owed this promotion, no doubt, to the influence of his kinsmen the Murrays, and it contributed not a little to the rising fortunes of his own house. He was followed beyond the Spey by four brothers, of whom one became sheriff of Elgin; another became a canon of Murray; a third, who had been a monk of Kelso, seems to have become archdeacon of Murray; and a fourth, who had been parson of Douglas, appears to have become dean of Murray.

2. *Sir Archibald, or Erkenbald, of Douglas* is a witness to charters between 1190 and 1232. He attained the rank of knighthood, and beside his inheritance of Douglas, held the lands of Hailes, on the Water of Leith, from the monks of Dunfermline, and had a grant of the lands of Levingston and Hirdmanston from the earl of Fife. He is said to have acquired other lands in Clydesdale by his marriage with one of the two daughters and heiresses of sir John of Crawford.

3. *Sir William of Douglas*, apparently the son of sir Archibald, figures in record from 1240 to 1273. He appears in 1255 as one of the Scottish partisans of king Henry III. of England; and in 1267, is found in possession of the manor of Fawdon, in Northumberland, by gift of the king's son (afterwards Edward I.). He seems to have had a brother, sir Andrew, the progenitor of the Douglasses of Dalkeith and Morton, and certainly had two sons.

4. *Hugh of Douglas*, the elder, acquired land in Glencorse, in Lothian, by marriage with the sister of sir Hugh of Abernethy; and dying without issue about 1287, was succeeded by his younger brother.

5. *Sir William of Douglas*, distinguished in the family traditions as *William the Hardy*, had all the daring and restless spirit which was characteristic of his descendants. His first appearance is in 1267, when his head was nearly severed from his shoulders in defending his father's English manor from a foray of the men of Redesdale. Twenty years later, he is found at the head of an armed band, carrying off his future wife, a wealthy widow, Alionora of Lovaine, from the manor of her kinsfolks, the La Zouches, at Tranent, in Lothian. We hear of him immediately afterwards as spoiling the monks of Melrose, deforcing the king's officers in the execution of a judgment in favor of his mother, unlawfully imprisoning three men in his castle of Douglas, and beheading one of them. He was the first man of mark who joined Wallace in the rising against the English in 1297; and for this his lands of Douglas were wasted with fire and sword, and his wife and children carried off by Robert Bruce, the young earl of Carrick, then a partisan of England. But the knight of Douglas soon left the insurgent banners, and submitting to his old patron, king Edward I., to whom he had again and again sworn fealty, was sent prisoner to the castle of York, where he died about 1302. It appears that he possessed lands in one English, and in seven Scottish counties—Northumberland, Berwick, Edinburgh, Fife, Lanark, Ayr, Dumfries, and Wigton.

6. The history of his son, *the Good Sir James of Douglas*, is familiar to every one, as Bruce's greatest captain in the long war of the succession. The hero of seventy fights, he is said to have won them all but thirteen, leaving the name of "the black Douglas"—so he was called from his swarthy complexion—as a word of fear by which English mothers stilled their children. He was slain in Andalusia, in 1330, on his way to the Holy Land with the heart of his royal master, and dying unmarried, was succeeded by his brother.

7. *Hugh of Douglas*, of whom nothing is known except that he made over the now great domains of his family, in 1342, to his nephew *Sir William of Douglas* (son of a younger brother of the good sir James—sir Archibald of Douglas, regent of Scotland, slain at Halidon hill in 1333).

EARLS OF DOUGLAS.—Hitherto, the Douglasses had no higher title than that of knight; but in 1357, sir William of Douglas, who had fought at Poitiers, and distinguished himself in other fields, was made earl of Douglas, and afterwards by marriage became earl of Mar. His ambition aimed at still greater things, and in 1371 he disputed the succession to the Scottish crown with Robert II. (the first of the Stewarts). He claimed as a descendant of the Baliols and Cummings; and his pretensions were abandoned only on condition that his son should marry the king's daughter. He died in 1384. His son James, second earl of Douglas and Mar, the conqueror of Hotspur, fell at Otterburn in 1388; and as he left no legitimate issue, the direct male line of William the Hardy and the good sir James now came to an end. His aunt had married for her second husband one of her brother's esquires, James of Sandilands, and through her lord Torphichen is now the heir general and representative at common law of the house of Douglas.

The earldom of Douglas, meanwhile, was bestowed on an illegitimate son of the good sir James—Archibald, lord of Galloway, surnamed the Grim. By his marriage with the heiress of Bothwell, he added that fair barony to the Douglas domains; and having married his only daughter to the heir-apparent of the Scottish crown, and his eldest son to the eldest daughter of the Scottish king, he died in 1401. His son and successor, Archibald, fourth earl of Douglas, was, from his many misfortunes in battle, surnamed "the Tyneman," i.e., the loser. At Homildon, in 1402, he was wounded in five places, lost an eye, and was taken prisoner by Hotspur. Next year, at Shrewsbury, he felled the English king to the earth, but was again wounded and taken prisoner. Repairing to France, he was there made duke of Touraine, and fell at Verneuil in 1424. He was succeeded by his son Archibald, who distinguished himself in the French wars, and dying in 1439, was buried in the church of Douglas, where his tomb yet remains, inscribed with his high titles of "duke of Touraine, earl of Douglas and of Longueville, lord of Galloway, Wigton, and Annandale, lieutenant of the king of Scots." His son and successor, William, a boy of sixteen, is said to have kept a thousand horsemen in his train, to have created knights, and to have affected the pomp of parliaments in his baronial courts. His power and foreign possessions made him an object of fear to the Scottish crown; and, having been decoyed into the castle of Edinburgh by the crafty and unscrupulous Crichton, he was, after a hasty trial, beheaded, along with his brother, within the walls of the castle, in 1440. His French duchy and county died with him; his Scottish earldom was bestowed on his grand-uncle (the second son of Archibald the Grim), James, surnamed the Gross, who in 1437 had been made earl of Avondale. He died in 1443, being succeeded by his son William, who, by marriage with his kinswoman (the only daughter of Archibald, fifth earl of Douglas, and second duke of Touraine), again added the lordship of Galloway to the Douglas possessions. He was, for a time, all-powerful with king James II., who made him lieutenant of the realm; but afterwards losing the royal favor, he seems to have entered into a confederacy against the king, by whom he was killed in Stirling castle, in 1452. Leaving no child, he was succeeded by his brother James, who, in 1454, made open war against king James II., as the murderer of his brother and kinsman (the sixth and eighth earls of Douglas). The issue seemed doubtful for a time,

but the Hamiltons and others being gained over to the king's side, Douglas fled to England. The struggle was still maintained by his brothers, Archibald, who by marriage had become earl of Murray, and Hugh, who in 1445 had been made earl of Ormond. They were defeated at Arkinholm in May, 1455, Murray being slain on the field, and Ormond taken prisoner, and afterwards beheaded. Abercorn, Douglas, Strathaven, Thrieve, and other castles of the Douglasses, were dismantled; and the earldom of Douglas came to an end by forfeiture, after an existence of 98 years, during which it had been held by no fewer than nine lords. The last earl lived many years in England, where he had a pension from the crown, and was made a knight of the garter. In 1484, he leagued himself with the exiled duke of Albany to invade Scotland. He was defeated and taken prisoner at Lochmaben, and, on being brought to the royal presence, is said to have turned his back upon the king. The compassionate James III. spared his life, on condition of his taking the cowl. "He who may no better be, must be a monk," muttered the old man, as he bowed to his fate. He died in the abbey of Lindores, in April, 1488; and so ended the elder illegitimate line of the Douglasses.

EARLS OF ANGUS.—Meanwhile a younger illegitimate branch had been rising to great power. William, first earl of Douglas, was the faithless husband of a faithless wife. She was believed to have had a paramour in sir William Douglas of Liddesdale. Her jealous husband, who slew that "flower of chivalry," had himself shared the affections of the wife of his wife's brother, Margaret Stewart, countess of Angus and Mar. The issue of this amour, which in that age was accounted incestuous, was a son George, who, in 1389, had a grant of his mother's earldom of Angus; married, in 1397, the youngest daughter of king Robert III.; was taken prisoner at Homildon in 1402, and died of the plague in England in the following year. He was succeeded by his son William, who, dying in 1437, was succeeded by his son James, who died without issue, when the title reverted to his uncle. George, fourth earl of Angus, took part with the king against the Douglasses in 1454; his loyalty was rewarded by a grant of their old inheritance of Douglasdale; and so, in the phrase of the time, "the Red Douglas"—such was the complexion of Angus—"put down the Black." He died in 1462, being succeeded by his son Archibald, surnamed Bell-the-Cat, and sometimes also called the great earl. After filling the highest offices in the state, and adding largely to the family possessions, he retired to the priory of canons regular at Whithorn, in Galloway, where he died in 1514. Having outlived his eldest son, he was succeeded by his grandson, Archibald, who, in 1514, married the queen-dowager of Scotland, Margaret, sister of Henry VIII. of England, and widow of James IV. of Scotland. The fruit of this marriage was a daughter, Margaret, who, marrying the earl of Lennox, became the mother of Henry, lord Darnley, the husband of queen Mary, and father of king James VI. The earl of Angus had, for a time, supreme power in Scotland, but in 1528, the young king, James V., escaped from his hands, and sentence of forfeiture was passed against Angus and his kinsmen. The king swore that while he lived the Douglasses should have no place in his kingdom; and he kept his vow. On his death in 1542, Angus returned to Scotland, and was restored to his honors and possessions. He died at Tantallon in 1556. His nephew, who succeeded him, died two years afterwards, leaving an only son, Archibald, eighth earl of Angus. This "good earl," as he was called, died in 1588, when his title devolved on his kinsman William, the grandson of sir William Douglas of Glenbervie, second son of Archibald Bell-the-Cat. Dying in 1591, he was succeeded by his son William, who next year obtained from the crown a special recognition of his high privileges as earl of Angus, of taking the first place and giving the first vote in parliament, of leading the vanguard in battle, and of bearing the crown in parliament. He seems to have been a man of scholarly tastes, and is said to have written a history of the Douglasses. Having turned Roman Catholic, he was forced to leave Scotland, and spent his latter years in exercises of devotion at Paris, where he died in 1611, being succeeded by his son.

MARQUISES AND DUKE OF DOUGLAS, AND LORDS DOUGLAS.—William, eleventh earl of Angus, was created marquis of Douglas in 1633, and dying in 1660, was succeeded by his grandson James, who died in 1700, leaving issue one son and one daughter. The son Archibald, third marquis of Douglas, was created duke of Douglas in 1703, and died childless in 1761, when his dukedom became extinct, and his marquiseate devolved on the duke of Hamilton, as descended in the male line from William earl of Selkirk, third son of the first marquis of Douglas. His grace's sister, lady Jane Douglas, born in 1698, and married in 1746 to sir John Stewart of Grandtully, was said to have given birth at Paris to twin sons in 1748. One of them died in 1753; the other, in 1761, was served heir of entail and provision general to the duke of Douglas. An attempt was made to reduce his service, on the ground that he was not the child of lady Jane Douglas; but the house of lords, in 1771, gave final judgment in his favor. He was made a British peer in 1790, by the title of baron Douglas of Douglas castle, which became extinct on the death of his son James, fourth lord Douglas, in 1857, when the Douglas estates devolved on his niece, the countess of Home. The title of earl of Angus was claimed in 1762, as well by the duke of Hamilton as by Archibald Stewart, afterwards lord Douglas; but neither urged his claim to a decision, and the title is still in abeyance. The right attached to it of bearing the crown of Scotland, was debated before the privy council in 1823, when it was ruled that lord

Douglas's claim to that honor, being a claim of heritable right, fell to be decided in a court of law. It has been supposed that the motto of the Douglas arms, *Jamais arrière*, "Never behind," alludes to the peculiar precedence inherent in their earldom of Angus. The bloody heart commemorates Bruce's dying bequest to the good sir James; the three stars which the Douglasses bear in common with the Murrays, seems to denote the descent of both from one ancestor.

EARLS OF MORTON.—Sir Andrew of Douglas, who appears in record in 1248, was apparently a younger son of sir Archibald, or Erkenbald, of Douglas, the second chief of the house. He was the father of William of Douglas, who, in 1296, swore fealty to king Edward I. for his lands in West Lothian, and who was probably the father of sir James of Douglas—surnamed of Lothian, to distinguish him from his kinsman of Clydesdale—who, in 1315, had a grant from Bruce of the lands of Kincavil and Calder-clere. He died about 1320, being succeeded by his son, sir William of Douglas of Liddesdale, who acquired the lordship of Dalkeith (by resignation of the Grahames), the barony of Aberdour in Fife, lands in Tweeddale, and great territories in Liddesdale, Eskdale, and Ewesdale which had been forfeited by the Soulics and Lovels. In 1335, he had a grant of the earldom of Athol, but resigned it in 1342. The knight of Liddesdale—as he was called by his contemporaries, who regarded him as "the flower of chivalry"—was assassinated in 1253 by his kinsman, William first earl of Douglas, partly to revenge his wife's dishonor, partly to revenge the death of sir David of Barclay, who had been assassinated at the instance of the knight of Liddesdale, in revenge for the slaughter of his brother John. Dying childless, he was succeeded by his nephew, sir James of Douglas of Dalkeith. This great chief, who died in 1420, saw Froissart sit as a guest at his board; himself possessed books of law, grammar, logic, and romance; and enjoined in his will that all the volumes which he had borrowed from his friends should be returned to them. His alliances were as princely as his life. His first wife was a daughter of "Black Agnes," the heroic countess of Dunbar; his second was a sister of king Robert II.; and he matched his eldest son, sir James of Douglas of Dalkeith, with a daughter of king Robert III. Their grandson married a daughter of king James I., and in 1458, was created earl of Morton. His grandson, the third earl, dying without male issue in 1553, the earldom devolved on his daughter's husband, the regent Morton—James Douglas, great-grandson of Archibald Bell-the-Cat. After his fall, the title went to Archibald eighth earl of Angus; and when he died childless in 1588, it passed to the lineal male descendant of sir Henry of Douglas (the son of sir John of Douglas, the brother of the knight of Liddesdale), sir William Douglas of Lochleven, who thus became seventh earl of Morton. His losses in the great civil war compelled him, in 1642, to sell Dalkeith to the earl of Buccleuch, and his Tweeddale and Eskdale lands to others; but Aberdour and other old domains of the family still remain with his successor, the earl of Morton, who, there is every reason to believe, descends legitimately in the male line from William of Douglas, the great progenitor of the race in the 12th century.

EARLS, MARQUESSES, AND DUKES OF QUEENSBERRY; EARLS OF MARCH, AND EARLS OF SOLWAY.—James, second earl of Douglas and Mar—the hero of Otterburn—had an illegitimate son, sir William of Douglas of Drumlanrig, whose descendants were created viscounts of Drumlanrig in 1628, earls of Queensberry in 1633, marquesses of Queensberry in 1682, dukes of Queensberry in 1684, earls of March in 1697, and earls of Solway in 1706. On the death of the fourth duke of Queensberry in 1810, that title, with the barony of Drumlanrig and other lands, went to the duke of Buccleuch; the title of marquess of Queensberry, with the baronies of Tinwald, Torthorwald, etc., went to the heir-male of the family, sir Charles Douglas of Kelhead; and the title of earl of March, with the barony of Neidpath, went to the earl of Wemyss. The title of earl of Solway had become extinct in 1778.

EARLS OF SELKIRK, FORFAR, AND DUMBARTON; VISCOUNT BELHAVEN, AND LORDS MORDINGTON.—In 1646, the third son of the first marquess of Douglas was created earl of Selkirk. In 1651, the eldest son of the same marquess was created earl of Ormond, and in 1661, earl of Forfar. In 1675, the fourth son of the same marquess was created earl of Dumbarton. In 1641, the second son of the tenth earl of Angus was created lord Mordington. In 1633, sir Robert Douglas of Spot, a descendant of the Morton family, was created viscount of Belhaven. Of all these titles, that of the earl of Selkirk is the only one not now dormant or extinct.

A History of the Houses of Douglas and Angus, by David Hume of Godscroft, was published at Edinburgh in 1644, in 1 vol. fol., and reprinted in 1748 in 2 vols. 8vo. It preserves the traditions of the family, and has some literary merit, but its accuracy is not to be trusted. The earlier history of the Douglasses has been critically examined by the late George Chalmers in his *Caledonia*, vol. i. pp. 579-84 (Lond. 1807); by Mr. Riddell in his *Remarks upon Scotch Peerage Law*, pp. 174-78 (Edin. 1833); by Mr. Cosmo Innes, in the *Registrum Episcopatus Moraviensis*, pp. xlv.-xlvii. (Edin. 1837); and the *Liber S. Marie de Calchou*, vol. i. pp. xxvii., xxviii. (Edin. 1846); and by Mr. Joseph Robertson in the *Origines Parochiales Scotiæ*, vol. i. pp. 152-60 (Edin. 1851). The descent of the houses of Angus and Dalkeith was first ascertained by Mr. Riddell in his *Remarks upon Scotch Peerage Law*, pp. 154-64 (Edin., 1833); and in his *Stewartiana*, pp. 82-4, 137-42. The charters and correspondence of the Morton family have

been edited for the Bannatyne club by Mr. Cosmo Innes in the *Registrum Honoris de Morton* (Edin., 1853, 2 vols. 4to).

DOUGLAS, GAWYN or GAVIN, a Scottish poet, was the third son of Archibald, fifth earl of Angus, and was b. in the year 1474 or 1475. He was educated at St. Andrews for the church, and was early appointed to the rectory of Hawch or Prestonkirk. In 1501 he was made dean or provost of the collegiate church of St. Giles. From the marriage of his nephew, the sixth earl of Angus, to the widowed queen of James IV., Douglas expected rapid preferment; but the jealousy of the nobility and the regent Albany was such that D., who had through the influence of the queen obtained the bishopric of Dunkeld directly from the pope, was tried before the Scottish peers, found guilty of conspiring against the privileges of the crown, and condemned to imprisonment. After reconciliation with the regent, he was set at liberty in about a year, and inducted into his bishopric. Owing to his nephew's ill-treatment of the queen, who thereupon joined with the regent against the Douglasses, Gavin D. was deprived of his bishopric, on which he went to England to obtain the aid of Henry VIII. He was, however, suddenly cut off at London by the plague in 1522, and was buried in the Savoy church. One of D.'s earliest poetic efforts was a translation of Ovid's *Remedy of Love*, but it has not been preserved. In 1501, he wrote his *Palace of Honor*, addressed to king James IV. The leading idea of the poem, and some of the details, resemble Chaucer's *Temple of Fame*. *King Hart*, the only other long poem of D., presents a metaphorical view of human life. But the most remarkable production of this author was a translation of Virgil's *Æneid* into Scottish verse, which he executed in the years 1512 and 1513, being the first version of a Latin classic published in Britain. It is generally allowed to be a masterly performance, though in too obsolete a language ever to be popular. D.'s verse is far from rhythmical to modern ears; yet the felicitous character of his allegories, and the rich beauty of his descriptions, might well tempt the lovers of genuine poetry to give him a trial. A collected edition of his works in four volumes was issued under the superintendence of John Small, M.A., in 1874.

DOUGLAS, GENERAL SIR HOWARD, Bart., G.C.B., son of admiral sir C. Douglas, was b. at Gosport in 1776. Entering the army when young, he served in Spain and Portugal in 1808 and 1809, and again in Spain in 1811 and 1812. He was governor of New Brunswick from 1823 to 1829, lord high commissioner of the Ionian Islands from 1835 to 1840, and from 1842 to 1847 was M.P. for Liverpool. In 1851, he became a gen. in the army, and col. of the 15th regiment of foot. He has written several treatises, among which are *An Essay on the Principles and Construction of Military Bridges*, and *the Passage of Rivers in Military Operations* (Lond. 1816); a treatise on *Naval Gunnery* (1819; 4th edit., 1855); *Observation on Carnot's Fortification*, etc. His treatise on *Naval Gunnery* is regarded as a standard authority in foreign countries, although his recommendations were not acted upon by the British admiralty until 13 years after the publication of his work. He censured the conduct of the war in the Crimea in 1855, and declared that Sebastopol could not be reduced unless by a change in the plan of operations, such as he traced. His prophecy was verified by the event. He also published *Considerations on the Value and Importance of the British and North American Provinces*, and a treatise entitled *Naval Evolutions*. He died Nov., 1861.

DOUGLAS, JOHN, D.D., was the son of a respectable shopkeeper of Pittenweem, Fifeshire, and was b. there in 1721. In 1736, he entered St. Mary's college, Oxford, where he took his bachelor's degree after five years' study. D.'s life is little more than a chronicle of his very numerous preferments, which ended in his being translated to the see of Salisbury in 1791. He died on the 18th May, 1807. D. only occasionally resided on his livings. He generally spent the winter months in London, and the summer months at the fashionable watering-places, in the society of the earl of Bath, who was his great patron. He was devoted to literature; but most of his productions were only interesting to his own time. Among other works chiefly of a pamphlet kind, he wrote a *Vindication of Milton from the Charge of Plagiarism*, adduced by Lauder (1750); *A Letter on the Criterion of Miracles* (1754); an ironical pamphlet against the Hutchinsonians and Methodists, entitled *The Destruction of the French Foretold by Ezekiel* (1759); and the *Introduction and Notes to Captain Cook's Third Voyage* (1781).

DOUGLAS, STEPHEN ARNOLD, 1813-61; a statesman; born Brandon, Vt., d. Chicago. His father, a respectable physician, died when he was two months old, leaving the mother in straitened circumstances. The son lived with her on a farm until he was 15 years old, when he apprenticed himself to a cabinet-maker. Before the end of two years his health failed and he abandoned his occupation. After attending Brandon academy for one year, he removed with his mother to Canandaigua, N. Y., and resumed his studies in the academy there, at the same time beginning to prepare himself for the legal profession. In 1833, he went to Winchester, Ill., walking a part of the way for lack of funds, and opened a school, which he taught for three months, still pursuing his studies for the bar. In 1834, he was admitted to practice and within a year was elected attorney-general for the state. He resigned this office, Dec., 1835, on being elected a member of the legislature. In 1837, he was appointed register of the United States land office at Springfield, but resigned in 1839. In 1837, he was nominated for member of congress by the democratic party, and came very near an election. In 1840,

he was appointed secretary of state of Illinois. In 1841, he was elected a judge of the supreme court of the state by the legislature, but resigned in 1843 to become again a candidate for congress. He was elected this time by over 400 majority, and re-elected for two successive terms. He resigned after his election for the third time, to accept the post of senator of the United States for six years from Mar. 4, 1847. As a member of the house of representatives, he took an active part in the political discussions of the time. In the Oregon controversy he took extreme ground against Great Britain, claiming the whole territory for the United States up to lat. 54° 40'. He was also an earnest advocate for the annexation of Texas, and as chairman of the committee on territories, 1846, reported the joint resolution declaring that country to be one of the states of the American union. He was an ardent supporter of President Polk in the war with Mexico. The bills to organize the territories of Minnesota, Oregon, New Mexico, Utah, Washington, Kansas, and Nebraska, were all reported by him, as were also those providing for the admission to the union of the states of Iowa, Wisconsin, California, Minnesota, and Oregon. He was a strenuous opponent of the "Wilmot proviso," and of every other measure for resisting the extension of slavery by federal action, holding to the doctrine called "squatter sovereignty"—the doctrine, in other words, that the settlers in a territory had the right to say whether they would have slavery or not. In Aug., 1848, however, he so far relinquished this doctrine as to propose an amendment to the Oregon bill, extending the Missouri compromise line of 36° 30' to the Pacific, thus prohibiting slavery in the region n. of that line, and recognizing it in that s. thereof. The amendment prevailed in the senate, but was lost in the house of representatives. The land was now filled with excitement upon the slavery question, and the compromise measures of 1850 were devised and passed as a "final settlement" of the controversy. Instead of quieting the agitation, however, they fanned it to an intenser heat. In 1852, D. was an unsuccessful candidate for the democratic nomination for president of the United States. During the congressional session of 1853-54, he reported the bill to organize the territories of Kansas and Nebraska, the freedom of which from slavery was solemnly guaranteed by the Missouri compromise of 1820. This restriction Douglas now proposed to repeal or disregard, leaving those territories under the doctrine of "squatter sovereignty," open to the introduction of slavery. The enactment of this measure created intense excitement in the northern states, and D. was hotly denounced. From this time forward the question of the extension or non-extension of slavery was the paramount issue before the country—the compromise measures of 1850 proving utterly abortive as a means of stopping anti-slavery agitation. In 1856, D. was again a candidate for the presidential nomination of his party, but James Buchanan gained the nomination. In 1858, desiring a re-election to the senate, he engaged in a political canvass of the state of Illinois—Abraham Lincoln, the republican candidate for senator, being his antagonist. They spoke from the same platform in regular debate, upon conditions mutually agreed to, in every quarter of the state. A majority of the popular vote was cast against him, but D. carried the legislature by a small majority, and was consequently re-elected to the senate. He was in favor of the annexation of Cuba to the United States, and a warm champion of the Pacific railroad. In the presidential election of 1860, the democratic party was divided, D. being supported by the northern and Breckinridge by the southern section. The republicans nominated and elected Abraham Lincoln. After the beginning of the war between the states, D. took strong ground in favor of the union, giving his influence to uphold the general government. During his last illness, he dictated for publication a letter in which he declared it to be the duty of all patriotic men to sustain the union, the constitution, the government, and the flag, against all assailants. He was short of stature, but stoutly built, and was familiarly called "the little giant." He was endowed with qualities which gave him great power over masses of men. His first wife (1847) was Martha, daughter of Col. Robert Martin of Rockingham co., N. C.; his second, Adele, daughter of James Madison Cutts of Washington. By his first wife he had three children. See *Lives*, by Sheahan (N. Y., 1860); Flint (Phila., 1860).

DOUGLASS, DAVID BATES, 1790-1849; b. N. J.; graduate of Yale, 1813. He went into the army, and was one of the defenders of fort Erie, for which he was breveted captain. In 1815, he was assistant professor of natural and experimental philosophy at West Point; in 1819, astronomical surveyor in fixing the boundary with Canada from Niagara to Detroit, and the next year in the same capacity further west. In 1832, he accepted the professorship of civil architecture in the university of New York, and prepared the designs for the building on Washington Square. He surveyed the region of Croton river, with a view to a supply of water for the city; his plan was accepted, and he was appointed chief engineer. In 1839, he planned and laid out Greenwood cemetery. From 1841 to 1844, he was president of Kenyon college. In after years he laid out cemeteries at Albany and Quebec. His last official position was professor of mathematics and natural philosophy in Hobart college.

DOUGLASS, FREDERICK, American orator and journalist, was born at Tuckahoe, near Easton, Maryland, about 1817. His father was a white man, his mother a negro slave, and he was reared as a slave on the plantation of Col. Edward Lloyd until 10 years old, when he was transferred to a relative of his owner at Baltimore. There he

worked in a ship-yard, and taught himself to read and write. At the age of 21, he escaped to New York, and thence to New Bedford, in Massachusetts, where he married a woman of color, and worked until 1841, when he attended an anti-slavery convention at Nantucket, and spoke so eloquently on the subject of slavery, that he was employed as an agent of the Massachusetts anti-slavery society, and lectured for four years with great success. In 1845, he published his autobiography, and accepted an invitation to make a lecturing tour in Great Britain, where, in 1846, a contribution of £150 was made to buy his freedom. Returning to America, he established, in 1847, *Frederick Douglass's Paper*, a weekly abolition newspaper, at Rochester, N. Y. In 1855, he re-wrote his autobiography, republished, 1882, as *Life and Times of F. D.* In 1871, he was secretary to the Santo Domingo commission; in 1872 was a presidential elector for the state of New York; in 1876-81 was U. S. marshal for the District of Columbia; in 1881-86 was recorder of deeds in the District; and in 1889-91 was minister to Hayti. Mr. D. was a fluent speaker, and a ready debater. He d. in 1895.

DOUR, a t. of Belgium, in the province of Hainault, 9 m. w.s.w. of Mons. It is well built and prosperous. Coal and iron mines are worked in the vicinity; there are also many quarries, and to some extent, weaving, bleaching, and leather-dressing are carried on. Pop. '90, 10,603.

DOURO (Span. *Dueño*, Port. *Douro*), the name of one of the largest rivers of Spain and Portugal, rises in the province of Old Castile, about 30 m. w.n.w. of the town of Soria. From its source it flows s.e. to Soria, then winds towards the w., and pursues a general westward direction till it reaches the Portuguese border; it then flows s.w., forming for about 60 m. the boundary between Spain and Portugal; then crossing Portugal and flowing w., it falls into the Atlantic below Oporto. Its Portuguese tributaries are comparatively small. The total length of the river is about 485 miles. The D. is a noble river, and flows through some of the most imposing rock-scenery in the world, as at Barca d'Alva; but is rapid, and of difficult navigation, on account of rocks, sand-banks, etc. It passes through a large portion of the wine-country of Portugal, and conveys the produce to Oporto for exportation in flat-bottomed boats.

DOUROCOULI, a small monkey of Brazil, sleeping by day but active and fierce at night in pursuit of birds and insects. The body is only about 9 in. long, the tail 14; fur soft and grayish white, with a brown stripe down the back. The douroucouli looks more like a cat than a monkey, and sits up like a dog. It has a harsh disagreeable voice. See illus., *MONKEYS, ETC.*, vol. X.

DOUSA, JANUS, (JAN VAN DER DOES), 1545-1604; a Dutch statesman, historian, poet, and philologist, the defender of Leyden. He studied at Douay, Paris, and in other cities, and became friendly with many eminent scholars. In 1572, he was sent as ambassador to England, and in 1574, was charged with the government and defense of Leyden, then besieged by the Spaniards. When the university of Leyden was founded he was appointed first curator. In 1585, he was sent to England to solicit assistance from queen Elizabeth. In 1591, he was a member of the states-general. His principal work was the *Annals of Holland*.

DOVE (probably from the same root as *dive*, owing to its habit of ducking the head; compare Lat. *columba* with Gr. *kolumban*, to dive), a name sometimes extended, as the name pigeon also is, to the whole family of *columbida*, sometimes like it restricted—at least when used without prefix—to the genus *columba* of the more recent ornithological systems. No distinction between the terms dove and pigeon is sanctioned either by constant scientific or general popular use. Audubon attempts to make a distinction, giving the name pigeon to those species of which many nests are built close together on the same trees, and dove to those which are solitary in their nidification; but this distinction is quite unsuitable to the European species, and contrary to British usage. See **PIGEON**.

DOVE. In Christian art, the dove is employed as an emblem of the Holy Ghost, no doubt from the fact of this being the form in which the Spirit descended on our Lord at his baptism. From the dove being also used to symbolize purity, it is generally represented white, with its beak and claws red, as they occur in nature. In the older pictures, a golden nimbus surrounds its head; the nimbus being frequently divided by a cross, either red or black. In stained glass windows we see the dove with seven rays proceeding from it, terminating in seven stars, significative of the seven gifts of the Holy Spirit. Holding an olive branch, the dove is an emblem of peace. When seen issuing from the lips of dying saints and martyrs, it represents the human soul purified by suffering. A dove with six wings is a type of the church of Christ; and when so employed, it has the breast and belly of silver, and the back of gold, two wings being attached to the head, two to the shoulders, and two to the feet. The *pyx* or box for containing the host (q.v.) in Catholic churches, is sometimes made in the form of a dove, and suspended over the altar; and the dove is often placed on the covers of fonts. In this position it may still be seen in parish churches in England.

DOVE, HEINRICH WILHELM, one of the ablest recent physicists of the continent, was b. in 1803, at Liegnitz, in Silesia, where his father was a merchant. He studied at Breslau and at Berlin, at the latter of which he took the degree of doctor in 1826. He was successively "privatdocent" and assistant professor of natural philosophy in Königsberg. Having been transferred to a similar post in Berlin, he subsequently became full pro-

fessor, and was elected to a seat in the royal academy of sciences. His writings, which are very numerous, are to be found in the memoirs of that academy, and in Poggen-dorff's *Annalen*, besides several published separately. The most celebrated of these refer to meteorology, climatology, induced electricity, and circularly polarized light. We may mention among his works *Ueber Mass und Messen* (2d edition, Berlin, 1835), a treatise on the art of measuring, and the origin and comparison of the metrical standards of different nations; *Meteorologische Untersuchungen* (Berlin, 1837), a remarkable treatise, *Ueber die nicht periodischen Aenderungen der Temperaturvertheilung auf der Oberfläche der Erde* (4 vols., Berlin, 1840-47); *Untersuchungen in Gebiete der Inductionselectricität* (Berlin, 1843). In conjunction with other distinguished German philosophers, D. commenced, in 1837, the publication of an extensive series of treatises on different branches of natural philosophy. This work, called *Repertorium der Physik*, remains unfinished. In his capacity of director of all the Prussian observatories, he published annually an account of their labors. To him is due, amongst a great variety of optical discoveries, the application of the stereoscope to the detection of forged bank-notes—an ingenious and useful idea. To English readers, D. is best known by his treatise on the *Distribution of Heat on the Surface of the Globe*, which was published in 1853, by the British association. In this work he enters fully into the causes of periodic variations of temperature at different parts of the globe, and lays down in admirable charts the monthly and annual isothermal and isabnormal lines—thus tracing the variations in form and position of the different isothermals throughout the year. *Das Gesetz der Stürme* (4th ed., 1874) has also been translated (The Law of Storms). Other works are *Ueber Electricität* (1848); *Optische Studien* (1859); *Eiszeit, Föhn, u. Sirocco* (1867); *Klimatologie von Norddeutschland* (1871). D. died 4th April, 1879.

DOVE, RICHARD WILHELM, b. Berlin, in 1833; 1862, professor in the university of Tübingen; in 1865 at Kiel, and in 1868 at Göttingen. In 1873 he was nominated a member of the Prussian court of ecclesiastical affairs. In 1860 he established and began to edit the well-known periodical, *Zeitschrift für Kirchenrecht*, a leading European publication on ecclesiastical law.

DOVECOT. The right of erecting or keeping dovecots was in England formerly a privilege of manors, and was rigorously protected by law; but such exceptional privileges have long been abolished. The Scottish statute, 1617, c. 19, enacts that no person shall build a dovecot or pigeon-house, either in town or country, unless he be possessed of lands or teinds of the yearly value of ten chalders of victual, lying within at least two miles of it. Among the old noblesse of France the keeping of pigeons was an exclusive privilege, and large pigeon-cots are a marked feature of their chateaux.

DOVER, city, capital of Delaware, and co. seat of Kent co., on St. Jones river, 45 miles south of Wilmington and five miles west of Delaware Bay. The Delaware Division of the Phila., Wilmington & Baltimore railroad passes through it. Dover is regularly built on high ground. The public buildings are the state house, county building and court house, which stand in a beautiful square planted with elms, and a post-office building in the business centre. There are churches, Wilmington Conference Academy, banks, weekly newspapers, hotels, separate graded schools for white and colored children; also a large agricultural and manual training school for colored students, in the suburbs. The manufactories include canning factories, a foundry, and machine shops, a saw-mill, a basket and crate factory, planing-mills, and silk braid factory. Dover has a handsome monument erected in memory of Cæsar Rodney, one of the signers of the Declaration of Independence. Pop. '90, 3061.

DOVER, a city and co. seat of Strafford co., N. H., lies on both sides of the Cocheco river, two miles from its junction with the Piscataqua; 10 miles n.w. of Portsmouth, and 40 miles e. of Concord. The Cocheco has a depth of eleven feet at high tide, and here forms a good harbor. The city is at the head of navigation and is entered by branches of the Boston and Maine railroad. It is the oldest town in the state, having been settled in 1623, and in 1689 was attacked by the Indians, who killed twenty-three persons and carried twenty-nine into captivity. A city charter was granted in 1855. Dover is situated on hilly ground, is regularly laid out, contains many handsome private dwellings and a number of public buildings worthy of special mention, such as the city hall and the high school. There are several churches, a court-house, a public library, Franklin academy, public schools, national and savings banks, and daily and weekly newspapers. The chief industry is the manufacture of prints, cotton and woolen goods, machinery, foundry products, and shoes. The Cocheco river furnishes the chief water power, having several falls, one of which is 32½ feet high. An immense reservoir, Bow pond, fifteen miles from the city, is used as a supplemental source of supply during the dry season. Additional water power is furnished by Black river, in the south part of the city. Population '60, 8502; '80, 11,693; '90, 12,791.

DOVER, a city in Morris co., N. J., on the Rockaway river, the Morris and Essex canal, and the Delaware, Lackawanna and Western, and the New Jersey Central railroads, 28 miles w. of Newark. It has large iron interests, railroad car shops, hosiery mill, machine shops, silk mill, stove, furnace, and range works, electric lights, national bank, high school, business college, and daily and weekly newspapers. Five miles from the city the Federal government has established its principal powder depot. Pop. '90, not separately reported; '95, state census, 5,021.

DOVER, a parliamentary and municipal borough in the e. of Kent, 66 m. e.s.e. of London, and the head-quarters of the south-eastern district of the British army, is not only a charmingly situated watering-place, but, being the nearest point of the English coast to France, is a seaport of rapidly growing importance. The Admiralty Pier begun in 1848, was designed to form the western arm of the harbor. In 1891 a parliamentary bill for the carrying out of very extensive works in the harbor received the royal assent. The Admiralty Pier was to be extended and a new work, the East Pier, was to be built. The plan comprises also the construction of an iron viaduct 1260 feet in length, the surface being 19 feet above high water. The works, when completed, will form a sheltered area in the harbor of 36 acres, with a depth of from 3 to 6 fathoms, in low water. The memorial stone was laid by the Prince of Wales on July 20th, 1893. The reclamation of a large section of land, and the construction thereon of two railway jetties, also form a part of the plan. The first submarine block in the foundation of the East Pier was laid in 1894, and during the years 1895 and 1896 the work of construction made great progress. The fortifications comprise Dover castle, which occupies a commanding position on the chalk cliffs, 375 ft. above the level of the sea, and in the construction of which Saxons and Normans displayed no small amount of ingenuity; the western heights, fort Burgoyne, the south front, the drop redoubt, the citadel, the western outworks, and the north center bastion. No special trade is attached to the town, which transacts a miscellaneous maritime business with the French and Belgian ports, and offers excellent harbor accommodation for every variety of shipping. Pop. of borough, which returns two members to parliament (1891), 33,418. D. is well sheltered by the cliffs, and ends landward in a charming valley leading to what is known as "The Garden of Kent." In Roman days it was known as Dubris; the Normans called it *Dovere*; the French, *Douvres*; whilst in legal documents of this day the town is *Dovar*, all four terms being variations of the word "Dour," the name of the small river which runs through the town. Fortified and walled by William the Conqueror, during whose reign it was nearly burned down, noted as the place of king John's submission to the pope, besieged by the French, held during the civil war by the parliamentarians, threatened by the first Napoleon, and celebrated as the headquarters of the lord wardens of the cinque ports, D. holds a distinguished place in English history. Three submarine cables connect it with the continent, and plans for a tunnel have often been discussed. If carried out, they would bring France within half an hour's journey from Dover.

DOVER, STRAIT OF (*Frethum Gallicum, Pas de Calais*), the sea-channel between England and France, connecting the English channel and North sea, whose tides meet here. It is 18 to 25 m. broad, and 6 to 29 fathoms deep, but at Warne and Ridge Shoals only $1\frac{1}{2}$ to 4 fathoms. The English coast consists of chalk cliffs 300 to 600 ft. high, succeeded on the s. by lower greensand, and the French, from Calais to Cape Grisnez, is of similar strata. Britain and the continent seem to have been once united here by an isthmus. In Aug., 1875, Capt. Webb, an English naval officer, accomplished the wonderful feat of swimming the S. of D. in $21\frac{1}{2}$ hours.

DOVERON, or *DE'VERON*, a river of the n.e. of Scotland, rising in the w. of Aberdeenshire, a little s. of the Buck of the Cabrach (2377 ft. high). It runs 55 m. n.e., or 36 in a straight line, through adjacent parts of the counties of Aberdeen and Banff, and partly dividing them, past Huntly to the North sea at Banff. It drains a basin of 410 sq. m. composed of syenitic greenstone, metamorphic rocks, and old red sandstone.

DOVER'S POWDER is a preparation of powder of ipecacuanha 1 dram, opium in powder 1 dram, and sulphate of potash 1 ounce. The whole is thoroughly mixed, and the ordinary dose is from 5 to 10 grains. Occasionally, saltpeter is added. It is a most valuable medicine, and acts as a sudorific, increasing the proportion of sweat or sensible perspiration. In feverish conditions, where there is the dry furred tongue, and the dry skin, and the brain out of order, D. P. is reckoned to prove injurious; but where the tongue is moist, the skin moist and soft, and the brain comparatively unaffected, D. P. is of great service.

DOW, LORENZO, 1777-1834; born Conn.; an American preacher of limited education, noted for his eccentricities as well as zeal. In youth he was in much perplexity about religion, but finally joined the Methodists, and for a short time was a preacher in that denomination, which he left under a conviction that he was called to be a missionary to the Roman Catholics of Ireland. His preaching in that country attracted crowds of people, and brought him some persecution. He also visited England, introducing there the system of camp-meetings, which is still popular among the Methodists. After returning to the United States for a time, he repeated his visits to Ireland and England in 1805. He afterwards preached for many years in the United States, traveling all over the country, and sometimes making appointments a year in advance, which he filled at the exact day and hour. His natural eloquence and his eccentricities of dress and speech attracted large audiences everywhere. He preached much against the Jesuits, whom he regarded as conspirators against civil and religious liberty. His *Polemical Works* appeared in 1814. Among his other writings are *The Stranger in Charleston, or the Trial and Confession of Lorenzo Dow*; *A Short Account of a Long Travel*; and the *History of a Cosmopolite*—the cosmopolite being himself.

DOW, NEAL, a temperance reformer, born Me., 1804. He is the author of what is known as the "Maine Law," prohibiting the sale of intoxicating drinks in that state

under severe penalties, in operation since 1851. He was a brig.-gen. of volunteers in the war for the preservation of the Union, was taken prisoner near Port Hudson in 1863, and was Prohibition candidate for president in 1880. His 90th birthday (March 20, 1894) was observed by the Women's Christian Temperance Union throughout the world.

DOW'AGER (Fr. *douairière*, from *douaire*, dowry, dower, derived from the Greek and Lat. *dos*, a thing given, verb *do*, to give), a widow with a dower (q. v.); but commonly the title is applied only to the widows of persons of high rank. The queen-dowager, as the widow of the king, enjoys most of the privileges which belonged to her as queen-consort. But it is not high treason to conspire her death, because the succession to the crown is not thereby endangered. Still no man can marry a queen-dowager without special license from the king.

DOWDEN, EDWARD, English author, b. in Cork, Ireland, in 1843, was educated at Trinity college, Dublin, where he subsequently held the professorship of English literature. He wrote a *Primer of Shakespeare*, 1872, the success of which prompted him to another work on the same subject, *Shakespeare, His Mind and Art*, 1880, and in 1893 he published an *Introduction to Shakespeare*. His Shakespearian works have had a wide circulation and been employed as text books in college classes. They show a keen critical faculty and a genuine admiration of the great dramatist, though perhaps the classification of the latter's writings, according to the supposed psychological periods of his life, may appear somewhat fanciful. His other works are *Poems* 1876; *Studies in Literature*, 1873; *Southey* (in *The English Men of Letters*), 1879; *Life of Percy Bysshe Shelley*, 1886; *Transcripts and Studies*, 1888, and the *French Revolution in English Literature*, in 1897. The last named work is a collection of essays on the English authors at the close of the 18th and early part of the 19th century, which were delivered in the form of lectures on the occasion of the Princeton sesqui-centennial and published in the series called *Princeton Lectures*.

DOW, DOU, or DOWW, GERARD, one of the most exquisite of all the Dutch *genre*-painters, was b. at Leyden in 1613. He received his first instructions in drawing from one Dolendo, a draughtsman, and at the age of 15 entered the school of Rembrandt. That marvelous genius for color which the latter possessed, fascinated the young painter, who soon showed a similar mastery over *chiar-oscuro*, but at the same time developed artistic qualities of a wholly different kind from those of his master. The most insignificant incidents of daily life were precious to D., and were delineated with a delicacy, neatness, and care, that could not be surpassed. In his workshop, the utmost cleanliness prevailed. D. was true to nature in a degree positively wonderful. The richness, transparency, vigor, and harmony of his coloring are beyond all praise. In consequence, his pictures, though generally small in size, are considered gems of art, and have brought astonishing prices. One of his best works, "The Dropsical Woman," is valued at 30,000 guilders. Among his other pieces may be mentioned "The Village Grocer," "The Dutch Cook," "The Mountebank," "The Fiddler," "The Dentist," and "The Interior of a Household." His works, which are pretty numerous, are in all the great European collections. D. died at Leyden in 1680.

DOWEL (Fr. *douille*, socket), is a small wedge or piece of wood driven into the joints of brickwork, or into any wall, to which other pieces of wood may be fastened by nails; also, a vertical iron rod fixed into a wall and also into a body that is to be attached securely thereto.

DOWER. At common law, the one third interest of a wife in the real estates of inheritance of which her husband was seized during the coverture in such a way that the children of the two might have inherited it. This interest in her husband's real estate continues during her life, and may pass through three stages or forms. During the coverture and ownership of the property by the husband, she has an *inchoate* right of dower. This is a mere right or possibility of obtaining property by surviving her husband. It is a right, however, which the courts will protect, as between her and her husband. After the death of the husband, and before she has been put into possession of the specific one third of his realty which should be set apart for her, she has a right of action for the purpose of obtaining her dower lands. It is the duty of the husband's heirs, or purchasers, or other persons who may be in possession of the property, to set out or *assign* her one third to her, and her action lies to compel the performance of that duty. After such assignment has been made, and she has been given possession of the land, she acquires an interest or estate therein during her own life. In connection with her dower right she is also entitled to a residence in the chief house or home of her husband, for forty days after his death, provided she remain unmarried and chaste during that time, and in the meantime to have her reasonable sustenance out of his estate. This right is known as the widow's quarantine. Dower attaches to real property only, and not to personal chattels. It is strongly favored by the common law. No act that the husband alone can do will bar it. If he sell real estate to which his wife's dower right attached without having her unite in the transfer, the purchaser takes subject to such right. It is not necessary that the husband shall be actually in possession of the property in order to give the wife dower therein. The fact that he is seized, during the coverture, in fact or in law, of a beneficial estate of inheritance, legal or equitable, will be sufficient to support her claim to dower. But in England, and in many of the United States, modern statutes have materially modified the rights of the

wife in the husband's property. Where dower is preserved by such statutes, the husband is usually given power, by his own act or deed alone, to bar it as to property which he desires to sell during the coverture. In many of the older states of this country, however, the common law dower is still retained. In the absence of positive modern statutory changes, there are several ways in which dower may be barred. These are: 1. By an absolute divorce. In the absence of statutory qualifications, such a divorce bars dower whether it was obtained because of the misconduct of the husband or for that of the wife. But in some of the states of this country, if the wife obtain the divorce for the misconduct of the husband, she does not thereby lose her dower right. 2. If the wife join in the deed by which her husband conveys real estate, and indicate therein that she does so for the purpose of releasing her rights in that land, she will be thereby barred of dower. This method, which is now the one most commonly employed, is due to statutes uniformly enacted where dower exists, which declare that such a conveyance shall bar her dower rights. 3. If the wife induce any one to purchase her husband's real property by representing to him that she has no dower rights in such property, she will be estopped or precluded from subsequently claiming dower from that property against such purchaser or those who claim under him. 4. If the title of the husband be defeated, either while he lives or after his death, by one who claims under a paramount title, this will, in general, also defeat the wife's or widow's dower. 5. When, by the exercise of the right of eminent domain, the state takes real estate from the husband and makes compensation to him for it, the wife's right of dower in the property so taken is barred. But she may follow the proceeds or purchase money, and insist that her dower shall attach to that. 6. If, during the period of the statute of limitations (in most jurisdictions twenty years) after her husband's death, a widow fail to assert her claims upon his realty, her dower will be barred. 7. By a jointure, also, the dower of a widow may be defeated. Jointure is a provision for the wife, usually made before the marriage by the prospective husband. If made at that time in conformity to the requirements of the so-called statute of jointures, or if made at that time with the consent of the intended wife, although not in strict conformity to that statute, she may be compelled, after the husband's death, to abstain from claiming her dower, upon receiving the provision thus made for her in its stead. If the settlement thus made upon her conform to the statute of jointures, it is known as a legal jointure, and will be recognized and enforced in the common law events. If it do not conform to that statute, but be made with her consent, it is known as equitable jointure, since it can only be enforced in a court of equity. If the settlement or provision be made after the marriage, whatever may be its form, it is not an absolute bar to dower; but after the husband's death the wife may elect whether she will take her dower out of his real property or accept the provision thus made for her in lieu thereof. She is, in the same manner, compelled to make her election, if the husband give her property by his will and indicate expressly or by necessary implication that he means such gift, if accepted by her, to be received in lieu of dower.

DOWLAS, a kind of coarse strong linen, used by working-people for shirts, and manufactured largely at Knaresborough in Yorkshire, at Dundee, and at Newburgh and other places in Fifeshire. Since the introduction of calico, the home demand for dowlas has very much diminished, the article being little used except in the iron districts. The principal exports of D. are to Spain, and the countries inhabited by peoples of Spanish origin, in North and South America.

DOWLATABAD' (in English, *Abode of Prosperity*), a strongly-fortified t. of Hindustan, within the Nizam's dominions, near their n.w. frontier, in lat. 19° 57' n., and long. 75° 18' east. The town is commanded by a rock-fortress, which, with a height of about 500 ft., is scarped into a perpendicular for the lowest third of the altitude. This stronghold is all the more formidable from its being completely isolated, being fully 3,000 yards distant from any other eminence. The town of D. has greatly decayed, and has only a small population.

DOWLER, BENNET, a physician, b. Va., 1797; educated at the medical school of the university of Maryland; settled in New Orleans in 1836, where he gained high professional standing. He was for some years the editor of the *New Orleans Medical and Surgical Journal*. He is the author of a *Tableau of the Yellow Fever* of 1853, and of various contributions to the periodical literature of the profession. He founded the New Orleans academy of sciences. He performed many experiments upon the human body immediately after death, the results of which are valuable. He d. in 1879.

DOWN, a maritime co. in the s.e. of Ulster province, Ireland. It is 51 m. long, and 38 broad, with an area of 957 sq. m. It has a coast-line of 67 m., or 125 by the inlets, mostly low and rocky, and with many isles off it. The chief inlets are Belfast lough, 3 m. broad, and 15 deep; Strangford lough, $\frac{1}{2}$ to 3 m. by 10; Dundrum and Carlingford bays. The Mourne mountains cover 90 sq. m. in the s., and rise 2,796 ft. in Slieve Donard. The other parts of D. are mostly undulating and hilly, with plains and fine meadows along the rivers. The chief rocks are lower Silurian—covering most of the county—and granite, composing the Mourne and Croob mountains. The chief rivers are the Upper Bann and the Lagan. The Newry canal admits vessels of 50 tons, and with the Ulster canal opens communication through almost all Ulster. Thick marl beds occur in the alluvial tracts. The soils are chiefly stony and clayey loams. The chief crops are oats, potatoes, turnips, wheat, flax, and barley. Many pigs are reared. The chief manufacture is linen, especially the finer fabrics, as muslin, woven in the

houses of the small farmers. Flax and cotton mills have become common. Hosiery, leather, salt, thread, and woollens are also made. These, with corn, butter, pork, and hides, are the chief exports. D. is among the best cultivated of the Irish counties. The chief towns are Downpatrick, Newry, Newtownards, Bannbridge, and Donaghadee. Presbyterianism prevails in the towns and low country, and Roman Catholicism among the mountains, and in the barony of Lecale. D. has many ancient remains, as raths, round towers, castles, and abbeys. On the top of Slieve Croob (1755 ft. high) are 23 stone cairns, one being 54 ft. high. Pop. '81, 269,927; '91, 267,059.

DOWNCAST, the name of a shaft used for ventilating mines. The foul air is made to ascend through a flue by a fire burning at the bottom, while fresh air descends through the downcast.

DOWN EAST is a provincialism used in the other New England states for the state of Maine. A citizen of Maine is also alluded to as a *down-easter*. The origin is uncertain.

DOWNES, JOHN, 1786-1855, b. Mass.; an American naval officer. He entered the navy in 1802, and was in the frigate *New York* as midshipman during the war with Tripoli, distinguishing himself by gallant service. He was made a lieutenant in 1807, and served as such on board the frigate *Essex* against the British, under Capt. Porter, 1812-14, who assigned him to the command of the cruiser *Essex Junior*. In 1815, he commanded the brig *Epervier*, under Decatur, in the war against Algiers, and assisted in taking an Algerine pirate; also in capturing the Algerine brig *Estido*. In 1817, he was made captain, and commanded the frigate *Macedonian* in the Pacific, 1819-21. In 1828-29, he served in the Mediterranean squadron, and 1832-34 he was with the squadron in the Pacific. In 1837, he was appointed commander of the navy-yard in Charlestown, serving till 1842. He filled the same post again, 1850-52.

DOWNHAM MARKET, a small town in the w. of Norfolk co., England, on a hillside, on the right bank of the Ouse, 40 m. w. of Norwich, and 10½ s. of Lynn-Regis. It lies amid fen and dairy land. It has a bell-foundry, and a celebrated butter market. By the Ouse and Cam, vessels proceed from Lynn on the coast to Cambridge, 30 m. above Downham Market. *A market was confirmed here in the time of Edward the Confessor.

DOWNIE, DAVID, missionary, b. in Scotland, 1838, went to the United States in 1852, studied at Phillips Andover Academy, Brown University, and Rochester Theological Seminary. Having been appointed missionary of the American Baptist Missionary Union, in 1873, he went to Nellore, India, where he established a large number of missionary stations, and is said to have raised the number of communicants from 1500 to 80,000. He is the author of *The History of the Telugu Mission* (1893).

DOWNING, ANDREW JACKSON, 1815-52; born N. Y.; a pomologist and landscape gardener. In his chosen department he showed a fine taste, and introduced great and lasting improvements, developing a public appreciation of harmonious landscape decoration. He was drowned in the Hudson river when the steamer *Henry Clay* was burned. His works are *A Treatise on the Theory and Practice of Landscape Gardening*, and *Fruit and Fruit Trees of America*, both highly esteemed. He was for a time editor of the *Horticulturist*, published in Albany. A volume of his *Rural Essays*, with a memoir by George Wm. Curtis, was published after his death. To his suggestion, N. Y. City owes its Central Park.

DOWNING, CHARLES, brother of the preceding, was born July 9th, 1802, at Newburgh, N. Y., and died there Jan. 18th, 1885. He assisted his more famous brother in the compilation of *The Fruits and Fruit Trees of America*, and after the latter's death revised the book for several editions, his contributions to the book swelling it to twice its original size, and his labors making him well known as a pomologist and authority on horticultural and arboricultural matters in all parts of the world.

DOWNING, Sir GEORGE, 1623-84; b. Dublin; a nephew of Gov. John Winthrop. He graduated at Harvard coll., 1642; went to England and took service as chaplain in the Parliamentary army. Cromwell made him Resident at the Hague, where he secretly contrived to ingratiate himself with the exiled Stuarts. After the restoration he was knighted, 1663, and became sec. of the treasury and one of the commissioners of customs, 1667. One of a number of houses that he built in London, in the street which afterward took from him its name, Downing street, having been forfeited to the crown, has ever since the time of sir Robert Walpole been the official residence attached to the office of first lord of the treasury. His grandson founded Downing college.

DOWNING, Sir GEORGE, 1684-1749, the founder of Downing college, Cambridge, was a grandson of Sir George Downing who died in 1684. He sat in parliament from 1710 to 1713, was re-elected in 1722, and remained a member till his death.

DOWNING COLLEGE, CAMBRIDGE, founded solely by sir George Downing, of Gamlingay park, Cambridge, who, by a will of date 20th Dec., 1717, devised his estates in the counties of Cambridge, Bedford, and Suffolk to various relations in succession, and on failure thereof, to build and found a college on a plan to be approved of by the two archbishops of England and the masters of St. John's and Clare colleges. Owing to various litigations and other difficulties, it was not till 22d Sept., 1800, that the college received its charter, sealed with the great seal, nor till May, 1821, that the buildings were sufficiently advanced to admit of undergraduates residing and keeping terms.

DOWNING STREET is a short street in Whitehall, London, named from sir George Downing (secretary of the treasury in 1667), in which are located the colonial and foreign offices; also, since 1735, the official residence of the first lord of the treasury. Here cabinet councils are held, hence the term is sometimes employed to denote the government in office.

DOWNPATRICK (mount of Patrick), or Down, a municipal borough and cathedral town, in the s. of Down, of which it is the capital. It is situated near the mouth of the Quoyle, which flows into the s.w. end of lough Strangford, 74 m. n.e. of Dublin, and 21 m. s.e. of Belfast, with which town it is connected by railway. The cathedral was restored in 1790 on the site of one built in 1412, and burned in 1538 by lord deputy Grey. A handsome Catholic church was erected here in 1872. Vessels of 100 tons reach the quay a mile from Downpatrick. It has manufactures of linen, soap, leather, and malt liquors. Pop. '71, 3,621; '91, less than 3,500. Till 1885 it was a parliamentary borough and returned one member to parliament. To the n.w. of D. are the remains of great earthworks, $\frac{3}{4}$ m. in circuit, inclosing a conical rath 60 ft. high and 2,100 in circumference. D. was famous before the arrival of St. Patrick, who founded religious establishments here. D. was burned by Edward Bruce in 1315, and plundered by O'Neil in 1552. The holy wells of St. Patrick at Struel, $1\frac{1}{2}$ m. e. of D., were formerly resorted to by Roman Catholic pilgrims from all Ireland, but for the last fifty years the pilgrimage has ceased.

DOWN'S, THE, an important roadstead or shelter for shipping, off the s.e. coast of Kent, opposite Ramsgate and Deal, between North and South Foreland, and protected externally by the Goodwin sands—a natural breakwater with one to four fathoms water, and often partly dry at low tide. This large natural harbor of refuge is eight miles by six, with an anchorage of four to twelve fathoms, but having many sands and overfalls partly or wholly dry at low water. It is resorted to temporarily by outward and homeward bound vessels, and squadrons of ships of war, and is unsafe only in south winds.—It is defended by Deal, Dover, and Sandown castles.

DOWN'S (Ger. *dünen*, Fr. *dunes*, from the root *dun* (q.v.), common to the Gothic and Celtic languages, signifying a hill), a term usually applied to hillocks of sand thrown up by the sea or the wind along the sea-coast. It is also a general name for any undulating tract of upland too light for cultivation, and covered with short grass. It is specially applied to two broad ridges of undulating hills s. of the Thames, beginning in the middle of Hampshire, and running eastward, the one (the north D.) through the middle of Surrey and Kent to Dover (about 120 m.), and the other (the south D.) through the s.e. of Hampshire and near the Sussex coast to Beachy head (about 80 miles). Between the two ranges lies the valley of the Weald, from which the chalk strata are supposed to have been removed by denudation. Towards the Weald, the descent from both D. is rapid, and presents cliffs as of a sea-margin; while the opposite slopes are gradual. The highest point of the north D. is Botley hill, 880 ft.; and of the south D., Ditchelling beacon, 858 feet. These uplands are covered with fine short pasture, which, from its aromatic quality, forms excellent feeding-ground for the famous South Down sheep. The valleys occurring among the hills are usually fertile, and admit of cultivation, so that an excellent field is furnished for mixed husbandry. By pasturing the sheep on the D. during the day, and folding them on the arable fields at night, the latter are highly fertilized.

DOWN'TON, a small town in the s.e. of Wiltshire, on the right bank of the Avon, here split into three branches, 6 m. s.e. of Salisbury. It chiefly consists of one long street with the houses irregularly placed. It has paper-works, and an ancient cross. D., in the middle ages, had a castle, of which the mound or moat remains, and is a singular earthwork, on which Saxon justice was dispensed. Two miles n. of D. is the mansion and estate of Standlinch, the national gift to the heirs of lord Nelson, for which parliament voted £100,000.

DOXOLOGY, a Greek word, signifies an exclamation or prayer in honor of the majesty of God, such as Paul uses at the close of his epistles, and sometimes even in the middle of an argument (Romans ix. 5). The hymn of the angels (Luke ii. 14) is also called a D. by the Christian church; so likewise is the close of the "Lord's Prayer." The so-called "Great Doxology" is simply an expansion of the angelic hymn, and is sung in the Roman Catholic church at the celebration of the Lord's Supper, and at matins. It commences with the words, *Gloria in excelsis Deo* ("Glory to God in the highest"). The ordinary D., "Glory be to the Father, Son, and Holy Ghost, as it was," etc., is repeated at the end of each psalm in the service of the church of England; there is a similar D. in verse to suit different meters.

DOYLE, RICHARD, son of the celebrated caricaturist H. B., whose name was John Doyle, was b. in London in 1826. He became a contributor to *Punch*, and furnished its pages with the well-known sketches of "Ye Manners and Customs of ye English." In 1850, his connection with that publication ceased, and after that period Doyle employed himself in the illustration of books. Among his works of this nature may be mentioned the *Adventures of Brown, Jones, and Robinson*, and the illustrations to the *Newcomes* and the *Seouring of the White Horse*. He contributed "Sketches of Modern Society" to the *Cornhill Magazine*, and published a Christmas book for 1869, called *In Fairy Land*. His caricatures are all distinguished by the most genial humor, and the most graceful drawing. He d. 1883.

DOZEN, BAKER'S. See **BAKER'S DOZEN**.

DOZY, REINHART, one of the most learned orientalists of the present day, was b. 21st Feb., 1820, at Leyden. He belongs to a family of French origin, which settled in Holland after the revocation of the edict of Nantes. He studied at the university of his

native town, and devoted himself especially to oriental studies. In 1850, he was appointed extraordinary, and, in 1857, ordinary professor of history at Leyden. Besides his writings in the *Journal Asiatique* and other periodicals, D. has published *Dictionnaire détaillé des Noms des Vêtements chez les Arabes* (Amst. 1845); *Historia Abbadidarum* (Leyden, 1846-52); and editions of Abdo'l Wâhid al Marrékoshi's *History of the Almohades* (1847); of Ibn-Badrun's *Historical Commentary on the Poem of Ibn-Abdun* (1848), with introduction, notes, glossary, and index, and of Ibn-Adhari's *History of Africa and Spain* (1848-52). In 1849, appeared his masterly performance, *Recherches sur l'Histoire politique et littéraire de l'Espagne pendant le Moyen Age*. A second edition, enlarged and completely recast, was published in 1860. In this work, D. has exposed the gross and willful corruptions of the monkish chroniclers, who persisted in falsifying history for the benefit of Christianity, and who could form no more rational idea of the Moors than that they were "devils," or abetted by the devil, and sent to torment the Spaniards because of their sins. Other valuable productions of D. are his *Al-Makkari, Analectes sur l'Histoire et la littérature des Arabes d'Espagne* (Leyd. 1855-61); *Histoire des Musulmans d'Espagne jusqu'à la Conquête de l'Andalousie par les Almoravides* (Leyd. 1861); *Het Islamisme* (Harl. 1863); and *Die Israeliten zu Mekka* (1864). He d. 1883.

DRACÆNA DRACO, or DRAGON TREE, of the order *liliaceæ*, producing the resin called dragon's blood. Its thickness is greatly out of proportion to its height. The head is crowned with short branches bearing tufts of sword-shaped leaves. Humboldt saw a tree in Teneriffe which for 400 years had measured 45 ft. in circumference. The Guanches worshiped it, and had hollowed its trunk into a small sanctuary.

DRACHENFELS ("Dragon's Rock"), a mountain on the Rhine, is situated on the right bank of the river, about 8 m. s.e. of Bonn, and has an elevation of 1056 feet. It is of volcanic origin, consisting of lava, trachyte, and basalt. D. rises abruptly from the river, and is covered with brushwood almost to the top, whence the prospect is magnificent, extending down the river as far as Cologne, and having a charming foreground in Bonn, with its university, and numerous villages and time-worn castles. The cave where the dragon—from which the mountain takes its name—was wont to abide is pointed out to the traveler. The ruins of an old castle crown the summit, and add picturesqueness to the Drachenfels. It is one of the range called the Siebengebirge.

DRACHMA, **DRACHM**, **DRAM**. The D. was a silver coin, the unit of the money-system in ancient Greece. It varied in value in different parts of Greece and at different times. The Attic D. is estimated as equivalent to 18 cts. of our money—very nearly a French franc. The Æginetan D. was considerably more. But whatever its absolute worth, it always remained the 6,000th part of the *talent* (about \$1080), and the 100th part of the *mina* (about \$20), and was divided into six obols. There were also coins of two, three, and four drachmas. The D. (originally *a handful*) was also the name of a weight, and 100 drachmas made a *mina*, in weight, as in money. The weight of the D. is stated at from $\frac{1}{4}$ oz. avoirdupois to little more than half as much. At this lowest estimate, the *mina* = 1 lb. nearly. The unit in the monetary system of modern Greece, since 1833, has also been called *drachma*; it is equivalent to $\frac{5}{100}$ of a franc, or about 8 $\frac{1}{2}$ d. sterling, and is divided into 100 lepta. In the British system of weights there were, till recently, two drachms or drams: the avoirdupois *dram*—equal to 27 $\frac{1}{2}$ troy grains—and the apothecaries' *dram* (not now used), equal to 60 troy grains, or $\frac{1}{8}$ of an ounce troy. It is this last which is the representative of the ancient drachma.

DRACHMANN, HOLGER HENRIK HERHOLDT, a popular Danish author, was b. in Copenhagen, Oct. 9, 1846. At 20, he began to study art, but in 1872 began his poetical career with a volume of poems, since which time he has published many poems and prose stories, including *En Overkomplet* (1876) and *On a Sailor's Word* (1878).

DRACO, a constellation in the northern hemisphere. The star γ Draconis is celebrated as the one used in determining the co-efficient of aberration of the fixed stars. It is a bright star, nearly in the solstitial colure, and consequently the minor axis of the small ellipse which its apparent place describes in the heavens, lies in the meridian at its transit. Moreover, at the two equinoxes, when its apparent place is at the extremities respectively of this minor axis, it can be observed on the meridian at one equinox about sunrise, and at the other about sunset, so that both observations may be made without the interference of a too bright daylight. These two observations, therefore, are easily taken, and the difference in the north polar distance which they give, is the minor axis of the ellipse described by the apparent place of the star.

DRACO (Gr. *Drakon*), an Athenian lawgiver and archon, who, in the year 624 B.C., was appointed to draw up new laws for the disordered state. These, however, effected little change in the form of the state; but by being committed to writing, put an end to the arbitrary administration of justice on the part of the archons, and resulted in the establishment of a court of appeal—that of the *Éphetaë*. D.'s legislation had a beneficial and permanent effect upon the political development of Athens. The extraordinary severity of these laws, however, which punished the slightest theft, or even laziness, with death, no less than sacrilege, murder, and treason, caused them to be often neglected, and made them so hated, that Solon was appointed to draw out a new code. Solon, though he softened their severity in most instances, retained that law which punished a murderer with death. D., at a later period, went to Ægina, where, after

having introduced his laws, he is said to have been stifled in the theatre by the garments thrown upon him as a mark of respect by the people. The severity of his laws gave rise to a pun by Herodicus, who declared that D.'s laws were those of a dragon (Gr. *drakon*) and not of a man. Hence also originated the metaphorical remark of Demades, "that they were written not in ink but in blood." Extremely severe and sanguinary laws are still called *Draconic*.

DRACONTIUM, a genus of plants of the natural order *araceæ*, of which one species, *D. polyphyllum*, a native of Guiana, Surinam, and also of India and Japan, has a powerful action on the nervous system, and is useful in asthma; although at present its chief reputation is the somewhat doubtful one of curing the bite of a snake, to which its mottled stem gives it some resemblance. The flower, when it first expands, emits an intolerable stench.

DRACUT, a t. in Middlesex co., Mass., on the Merrimack, opposite Lowell, with which it is connected with bridges. Agriculture is the main business, but there are also some manufactures of woollens, paper, etc., and electric railroads. Pop. '90, 1906.

DRAESEKE, FELIX, composer, b. in Cologne, Oct. 7, 1835. He studied under Rietz in Leipzig and Liszt in Weimar, taught in the conservatories of Munich and Lausanne, and finally settled in Dresden. His works include symphonies for orchestra; piano-forte music; quintets, etc.; a *Requiem* for soli, chorus, and orchestra; and an opera, *Gudrun* (Hanover, 1884).

DRAFT, an order addressed to a debtor by his creditor, calling upon him to pay a certain sum either to the drawer or to a third party. See **BILL**, **CHECK**.

DRAFT, or **DRAUGHT**, a tentative copy of a legal document, or other formal writing, made for the purpose of adjusting the matter afterwards to be admitted into the fair copy, or engrossed, as it is called. Manuscripts and proof-sheets are the drafts of printed works.

DRAFT-RIOTS. The greatest riot ever known in American history began in New York city on July 13, 1863. The civil war had continued three years, and as many of the troops were three years' men whose time was about to expire, it became necessary to fill their places. Volunteers were coming in too slowly, and as a last resort, in March, Congress passed a conscription act, authorizing the President to recruit the army whenever necessary by a draft from the able-bodied citizens between the ages of twenty and forty-five. A general enrollment was made and due notice given that the draft would be made whenever the enrollment in each district was completed, and the quota assigned. Further notice was given in New York city that the draft would begin on Monday, July 13, and that in some of the sub-districts that were ready, it would begin on Saturday, the 11th, and, accordingly, it did begin on that morning, in the office located at Third ave. and Forty-sixth st., in the third sub-division of the Ninth Congressional district. The draft, which was made by means of a lottery wheel, continued all day, and at night 1236 names had been drawn, leaving only 264 to be drawn on Monday. The vicinity of the office was crowded the entire day, and though there were many clouded faces, and many utterances of discontent, yet there was nothing that seemed unreasonable. Neither was there any question of unfairness or partiality. All ranks and classes were represented in the list of the drafted, though the vagrant and roaming class had, perhaps, escaped in larger proportion than any other. But a number of these were drafted, too, and these were the desperate men who were ready to lead on the mob on Monday. The draft began again at the Third ave. office on Monday morning, and about nine o'clock the crowd was so dense that the street cars on Second and Third avenues were compelled to stop running. Then, a few ugly-looking men in the crowd cut the telegraph poles and wires near the enrollment office, but they were defeated in this part of their work by the superintendent of the police telegraph system, who happened to be passing in the street. Seeing the wires down, the police special wires among them, he quietly gathered them all up and wound them around a lamp-post. The crowd threatened violence, but he coolly remarked, "Only getting the wires out of your way, boys," and he was permitted to go unmolested. He hastened at once to a station in Thirty-fifth st., and telegraphed the facts to the main office, and this is supposed to be the first trustworthy intimation of the real danger that menaced the city. Extra squads of policemen were at once sent to the various enrollment offices, of whom sixty went to the one on Third ave. Among the names drawn on Saturday was that of the head of Fire Engine Co. No. "Thirty-three." Their engine house was located on Fifty-eighth st., near Broadway, and their engine was known as the "Black Joke." They were an exceedingly rough class of men, though not criminals, by any means, and on Sunday evening had decided that the proper thing for them to do was to go over to Third ave. in the morning and destroy every evidence of the draft that had called their chief. They arrived at the office shortly after the extra policemen. The police were an unexpected sight to them, but they hesitated only a few minutes. Some one, either in the rough crowd previously there or one of the "Black Jokers," fired a pistol shot, and as if it were a signal agreed upon, a rush was made for the office, and the "draft riot" was begun. From that moment the mob seemed let loose. The police fought bravely, giving the officials time to escape at the rear of the building, taking many of their papers and records with them; and then, with

a desperate charge, the police made good their own escape, severely bruised but without loss of life. Soon after this some one in the crowd produced a can of turpentine, and the office was set on fire. The upper floors were used as a tenement house for poor people. These were permitted to escape with their lives, but they were not allowed to save any of their household goods. Neither were the firemen who came when the alarm was sounded allowed to put out the fire, and the whole block with the exception of a part of a building was destroyed. This was the first of twenty-four distinct fires reported in different parts of the city in the course of the next twenty-four hours, all kindled by the rioters. No firearms had been used as yet, and, as if the crowd suddenly thought of them, they wended their way to the armory corner Third ave. and Twenty-fourth st., and after many attempts succeeded in storming the main entrance; and it was but a few minutes' work to rifle the building of its contents, and set it on fire in a dozen different places. Many of the rioters had gone to the drill room, and the partitions, floors, and stairways were soon one vast sheet of flame, cutting them entirely off from all means of escape, and it will never be known how many perished in that terrible furnace. While all this was taking place the mob was rising and acting in every part of the city. The cry of "down with the rich man" was frequently heard, and no well-dressed person was safe on the street. The greed of plunder early manifested itself, and a rapidly increasing mob was rushing up Lexington and other avenues, pillaging the houses and setting them on fire out of sheer envy excited by their elegance. The residence of Mayor Opdyke seemed a particular object of hatred. The mayor himself had taken no precaution, but one of his friends gathered a party of well-armed citizens and took possession of his residence as a garrison. The events proved the wisdom of his course. Several mobs came there, and seeing the rifles in and about the house, concluded to withdraw. One of these mobs, increasing rapidly as it went, started down Broadway for the Wall st. banks. On their way, they proposed also to take the Lafarge House, because of the large number of colored servants employed there. They were armed with iron bars, axes, clubs, pitchforks, and a few muskets and pistols. By the time they reached Amity st., the mob had swelled to a thousand men. Every colored man they met was beaten and stoned as "the cause of the war," and therefore responsible for the Draft act. At Bleecker st. and Broadway they were met by about two hundred policemen, and then came the first regular battle between the mob and police, and the latter won a complete victory. About this same hour, another detachment of the mob was performing a most cowardly deed. The Colored Orphan Asylum on Fifth ave. and Fifty-fourth st. was one of the noblest charities of the city. It was a spacious and elegant building, worth \$200,000. When the attack was made there were in it about two hundred children, all small, with the matrons, nurses, etc. This mob numbered about three thousand, and the barred doors on the Fifth ave. side resisted them just long enough to allow the escape of the little ones through the rear entrances. The mob rushed in to their work of pillage, carrying off everything that they could, and breaking all furniture too bulky to be removed. Fires were lighted with this splintered furniture in all parts of the building, and the mob left the burning building to ransack and pillage the private residences in that vicinity, which were nearly all of the better class. The *Tribune* and *Times* offices on Printing House square were also attacked, but a timely arrival of the police made the mob finally retreat after several unsuccessful attempts to destroy the presses and set fire to the buildings. Riots were kept up for three days, extending to Brooklyn, where a new grain elevator, worth \$100,000, was burned; also to Harlem, where the bridge over McComb's Dam, Washington Hotel and many other buildings were burned. The railroads were among the things early attacked, in order to impede the movements of militia sent to enforce order. But many private citizens had joined with the militia already in the city, and soldiers were summoned from the military posts in the immediate vicinity of the city, so that plunder and destruction received some check towards the middle of the week. There was, however, a greater loss of life, though chiefly among the rioters. As the plundering was checked, the rioters contented themselves with attacking negroes wherever they could find them, and in a number of instances, murdering them. But, on Thursday and Friday, several regiments arrived from the seat of war, and the riot was soon a thing of the past.

There were also riots in Troy and Jamaica, N. Y., and in Jersey City and Boston, with considerable disturbance in many other places, but they were all plainly sympathetic with the New York riot, and quickly subsided when that was put down.

DRAG, a mechanism for slackening the speed of carriages, by operating on one or more of the wheels. The form of D. best known to old travelers by coach is that of the "shoe," a hollow piece of iron attached by a chain to the carriage, which being put below one of the hind wheels, partially reduced the vehicle to the quality of a sledge: by which dragging process the carriage was suitably retarded on going down-hill. As the shoe-drag required to be applied and removed with some inconvenient detention of the vehicle, a step was made in advance when a method of retarding a wheel without detention was discovered. This new process, which is known as the patent drag, consists of a connected piece of mechanism, altogether operated upon by the driver without moving from his seat. A handle affects a series of rods and levers by which a species

of shoe is pressed against one of the wheels, so as to slacken its motion. Such is the kind of drag now very generally attached to gentlemen's traveling-carriages, omnibuses, and other vehicles for passengers on the roads of Great Britain. It is of French origin. Applied in either form, the use of the drag, independently of its safety, is to allow horses to continue running at ordinary speed down-hill without being unduly pressed on by the carriage behind them. A similar contrivance, but of a more powerful kind, called a *break* or *brake*, is applied to arrest the motion of railway-trains. See RAILWAYS.

DRAG. See COACH.

DRAG-HUNT. In parts of the country where foxes are not plentiful, a substitute is found for hunting purposes in the shape of an anise-seed bag, the scent of which is so similar to that of a fox as to deceive a pack of hounds. Previous to the "hunt" the anise-seed bag is drawn over a long and difficult course, and over this the hounds and huntsmen follow an imaginary fox. The anise-seed bag is technically known as the "drag" and the hunt as a "drag-hunt."

DRAGOMAN, from the Turkish *trukéman*, the general name given in Turkey to an interpreter, or to a guide to foreigners. The common dragoman corresponds exactly to the Italian *cicerone*, or the French *commissionnaire* or *valet de place*. There are several connected with the hotels at Constantinople and other Turkish cities, who pounce eagerly upon European travelers, to perform every imaginable service. The diplomatic dragomen are, however, important personages, being the medium of communication between the Christian ambassadors and the sublime porte. Though usually natives, they and their families enjoy the privilege of being under the protection of the embassy they serve, and are subject to the laws of the country of that embassy, and not to the Turkish law. This privilege, which is also enjoyed by all the subjects of the great Christian powers resident in Constantinople, etc., is much valued, on account of the greater severity of the Turkish laws, and the summary manner in which they are executed. These dragomen are mostly of Italian extraction.

DRAGON, a name applied in modern natural history, both popularly and by scientific authors, to different kinds of saurian reptiles. Some of these (the genus *draco* of Linnaeus) are remarkably characterized by false ribs extending from the sides, so as to support a membrane which is used as a parachute. These are called flying dragons (q.v.), or flying lizards. Another reptile which has received the name D., and is also called D. *LIZARD adu*, belongs to a family of saurians, *teyidae*, found only in America, closely allied to the *varanidae* of the old world, and to which, in common with them, the names MONITOR and SAFEGUARD have sometimes been given, in consequence of their being supposed—although erroneously—to give warning by a hiss of the proximity of a crocodile or alligator. It inhabits the marshy plains of Guiana, climbs trees with facility, bites severely, has a long compressed tail, the back and tail crested, the tongue forked like that of a serpent, and attains a length of about 6 feet. Both its flesh and eggs are used as articles of food.

DRAGON. In the mythical history and legendary poetry of almost every nation, the D. appears as the emblem of the destructive and anarchic principle, as it manifests itself in the earlier stages of society—viz., as misdirected physical power and untamable animal passion. Like the serpent, the D. is always a minister of evil, of the principle which aims at negation, opposition, and contradiction, the object of which is to fight against order, harmony, and progress. But whilst the serpent seeks the attainment of its object by cunning and deceitful artifices—crawling on its belly, and always assuming ostensibly characteristics the very opposite of its own—the D. proceeds openly to work, running on its feet, with expanded wings, and head and tail erect, violently and ruthlessly outraging decency and propriety, spouting fire and fury from both mouth and tail, and wasting and devastating the whole land. The destruction of this disorderly element was one of the first objects of human energy, but it was an object which was unattainable by merely human means, and mankind were accordingly indebted for its accomplishment to that intermediate class of beings known as heroes in classical antiquity. As the highest ideal of human strength and courage, the task properly fell to Hercules; but it was not confined to him, for we find both Apollo and Perseus represented as dragon-slayers. From legendary poetry, the D. passed into art, some of the earliest efforts of which probably consisted in depicting it on the shield, or carving it for the crest of a conqueror's helmet. The D. does not seem to have been a native emblem with the Romans, and when they ultimately adopted it as a sort of subordinate symbol, the eagle still holding the first place, it seems to have been in consequence of their intercourse with nations either of Pelagic or Teutonic race. Amongst all the new races which overran Europe at the termination of the classical period, the D. seems to have occupied nearly the same place that it held in the earlier stages of Greek life. In the *Nibelungen Lied*, we find Siegfried killing a D. at Worms; and the contest of Beowulf (q.v.), first with the monster Grendel, and then with the D., forms the principal incident in the curious epic which bears the name of the former. Even Thor himself was a slayer of dragons (J. Grimm, *Deutsche Mythologie*, ii. 653). Among the Teutonic tribes which settled in England, it was from the first depicted on their shields and banners; and Dr. Plott, in his History of Oxfordshire, ascribes the origin of the very ancient custom of carrying the D. in procession at Burford, in great jollity, on midsummer eve, to the fact of a banner adorned with a golden D. having been taken by a king of the West Saxons from a king of Mercia. The custom, however, is said by Brand, on

the authority of Aubanus, to have prevailed in Germany, and was probably common in other parts of England (Brand's *Pop. Antiq.*, i. 321). Nor was the D. peculiar to the Teutonic races. Amongst the Celts, it was the emblem of sovereignty, and as such borne as the sovereign's crest. Mr. Tennyson's *Idylls* have made every one familiar with "the dragon of the great pendragonship," blazing on Arthur's helmet, as he rode forth to his last battle, and "making all the night a stream of fire."

The fiery D., or drake, and the flying D. in the air, were meteoric phenomena, of which we have frequent accounts in old books, and, indeed, as Brand remarks, "the dragon is one of those shapes which fear has created to itself," and which appears in circumstances, and clothes itself in forms, as various as our fears.

In Christian art, the D. is the emblem of sin, the usual form that is given to it being that of a winged crocodile. It is often represented as crushed under the feet of saints and martyrs, and other holy personages. Sometimes its prostrate attitude signifies the triumph of Christianity over paganism, as in pictures of St. George and St. Sylvester; or over heresy and schism, as when it was adopted as the emblem of the knights of the order of the D. in Hungary, which was instituted for the purpose of contending against the adherents of John Huss and Jerome of Prague.

The D. is often employed in heraldry; and other animals, such as the lion, are sometimes represented with the hinder parts resembling dragons. An animal so represented is said to be *dragonné*. See GRIFFIN. A D. without wings is called a lindworm, or lintworm, which Grimm (*Deutsche Mythol.*, ii. 652) explains to mean a beautiful or shining worm.

DRAGON, GREEN, *Dracunculus vulgaris*, a plant of the natural order *araceæ*, which receives its name from its spotted stem. It is a native of the s. of Europe. Its flowers are black, remarkably fetid, and give out exhalations which cause headache, giddiness, and vomiting. The root is emetic, and, probably for no better reason than the peculiar appearance of the stem, has been supposed useful for curing serpent-bites.

DRAGONET, *Callionymus*, a genus of fishes of the goby (q.v.) family (*gobiadæ*), remarkable for having the gill-openings reduced to a small hole on each side of the nape, and the ventral fins placed under the throat, separate, and larger than the pectorals. They have no air-bladder. The species are pretty numerous; most of them finely colored, as the GEMMEOUS D. (*C. lyra*) of the British coasts—called *gowdie* (*gowd*, gold) in Scotland—a fish about 10 or 12 in. long, the prevailing yellow color of which is varied with spots of sapphire blue, etc.

DRAGON-FLY, *Libellula*, a Linnæan genus of neuropterous insects, now constituting the family *libellulidæ*. They are in general very beautiful, rivaling butterflies in their hues, and like them loving the sunshine. They are, however, easily distinguished from butterflies, even at a distance, by their more slender form and comparatively narrow gauze-like wings; and differ from them still more widely in their habits, as they do not feed on the nectar of flowers, but prey on other insects, which they pursue with rapid flight. Dragon-flies have a large head; the mouth is formed for mastication, and its parts, especially the mandibles, possess great strength.—See the article COLEOPTERA for an explanation of the structure of the mouth in *masticating* insects, and the names of its parts.—The antennæ are short, awl-shaped, and of few joints. The eyes are large, lateral, and projecting. The wings—four in number—are equal in size, or nearly so, long, very thin, and very much reticulated. The legs are short. The abdomen in some is compressed, in others slender and cylindrical, in some remarkable for its extreme slenderness. The French name *demoiselle*, given to these insects, seems to be due to their beauty. They are, however, equally remarkable for their voracity. The great dragon-fly (*aeshna grandis*), an insect about 4 in. long, the largest of the British species, has been seen to dart upon a large cabbage-butterfly which passed as it was flitting up and down in search of prey; and then settling on a twig, it bit off the wings, and in less than a minute devoured the body.

Dragon-flies are usually most abundant in the vicinity of lakes, rivers, and marshes. They deposit their eggs in water, and the larvæ and pupæ are entirely aquatic, living chiefly at the bottom of the water, and creeping on the submerged parts of aquatic plants. They are as ravenous as the perfect insect, which in general form they pretty much resemble; aquatic insects are their food. The pupæ, unlike those of the greater number of insects, are active. They are provided with the means of drawing water into their bodies to supply air for respiration, and expel it again by the same orifice at the extremity of the abdomen, with such force, that they thus propel themselves through the water, whilst their legs are at rest. When the final transformation is about to take place, the dragon-fly pupa crawls out of the water on a stick, rush, or other object; fixes itself by hooks, with which its legs are furnished; and the skin then splitting at the back, the perfect insect comes forth, but with body and wings quite soft and moist, and the wings still folded up into small compass. In the sub-family of *agrionidæ*, the wings are elevated vertically in repose: in the true *libellulidæ* (*libellula aeshna*, etc.), they are extended horizontally.

Dragon-flies extend even into very northern regions, but are most abundant in warm climates. See *illus.*, BEETLES, ETC., vol. II.

DRAGONNADES, the name applied to a series of religious persecutions which took place in France in the reign of Louis XIV. and that of his successor, and which were intended to compel the Protestants of that country to renounce their religion. They consisted of armed expeditions, led by a bishop, an intendant, a sub-delegate, or a priest, who marched through the provinces, demanding of the heretics that they should abjure their faith, and leaving such as were refractory to be dealt with by the unscrupulous troops. Foremost among the armed force rode dragoons, who, from the fact of their taking the precedence, and also from the merciless treatment to which they subjected the Protestants, had the unenviable honor of giving a name to the persecutions. Louis XIV., who had been entirely misinformed as to the means employed in the D. by the courtiers and fanatics who surrounded his throne, was delighted to find that from 250 to 400 Protestants were daily being received into the bosom of the church, and in consequence, on the 22d Oct., 1685, a few months after the date of the first of the D., he revoked the edict of Nantes (q. v.), that the good work might be fully accomplished.

DRAGON ROOT, *Arisema atrorubens*, formerly *arum triphyllum*, a plant of the natural order *araceæ*, a native of North America, the tuber of which is a powerful local irritant, and is used as a stimulant of the secretions in chronic bronchitis, asthma, rheumatism, etc. The powder, made into a paste with honey, is beneficially applied to the mouths and throats of children in aphthæ; and milk, in which the root has been boiled, is a useful ointment in cases of scalled head, ringworm, etc.

DRAGON'S BLOOD, sometimes called gum dragon, an astringent, resinous substance, obtained from several trees of different natural orders, natives of warm countries. The greater part of the D. B. of commerce is probably the produce of *pterocarpus draco*, a large South American tree of the natural order *leguminosæ*, suborder *papilionaceæ*, which at some seasons appears as a magnificent mass of yellow blossom. A similar substance is yielded in the East Indies, by the red sandal-wood tree (*pterocarpus santalinus*); and *dalbergia monetaria*, a tree of the same order, yields it in Guiana. Mexican D. B., used in Mexico as a vulnerary and astringent, is obtained from *croton draco* (see CROTON), of the natural order *euphorbiaceæ*. The best kind of all is supposed to be produced by *calamus draco*, an East Indian palm, and part of it is said to be obtained from the fruit of the palm.—D. B. exudes from the surface of the leaves, and from cracks in the stem of the DRAGON TREE (*dracæna draco*), a tree of the natural order *liliaceæ*, remarkable for the size which it sometimes attains, rivaling even the baobab, and of which a celebrated specimen near Orotava, in the island of Teneriffe, was found by Humboldt in 1799 to have a stem about 45 ft. in circumference, and is described as having been of similar gigantic size in the beginning of the 15th century. The stem of the dragon tree is, however, generally short in proportion to its thickness, and its head consists of numerous short branches, terminating in tufts of sword-shaped leaves. It is not supposed to yield any of the D. B. of commerce.

D. B. is opaque, of a deep reddish-brown color, brittle, smooth, with a shining shell-like fracture, and when burned, emits an odor resembling that of benzoin. It is nearly insoluble in water, but is soluble in alcohol, and the solution will permanently stain heated marble, for which it is often used, as well as for staining leather and wood. It is also soluble in oils and turpentine, and enters into the composition of brilliant and much-esteemed varnishes. It was formerly employed in medicine, but is now almost out of use.—An astringent resin obtained from the *eucalyptus resinifera* of Australia is there called dragon's blood.

DRAGON'S MOUTH, or, in Spanish, BOCA DEL DRAGO, is the name of two straits or passages in the new world. One of them is in South America, separating Trinidad from the mainland, and connecting the gulf of Paria with the s.e. extremity of the Caribbean sea. The other is in Central America, being on the n.e. coast of Veragua, the most north-westerly portion of New Granada, and it communicates between the Caribbean sea and lake Chiriqui.

DRAGOON. From the old fable that the dragon spouts fire, the head of the monster was worked upon the muzzles of a peculiar kind of short muskets which were first carried by the horsemen raised by Marshal Brissac in the year 1600. This circumstance led to their being called dragoons; and from the general adoption of the same weapon, though without the emblem in question, the term gradually extended itself till it became almost synonymous with horse-soldier. Dragoons were at one time a kind of mounted infantry, drilled to perform the services both of horse and foot. At present, *dragoon* is simply one among many designations for cavalry, not very precise in its application. In the British army, the *heavy* dragoons and the *light* dragoons are carefully distinguished in regard to the weight of the men, horses, and appointments. The first dragoons in the army were the Scots Greys, established in 1683.

In the British army there are at present 7 regiments of "D. guards," and 21 regiments of "dragoons," besides the 3 cuirassed regiments of household troops. See HORSE GUARDS. In the U. S. army the term Dragoon is not now in use.

DRAGUIGNAN, a t. of France, in the department of Var, on a tributary of the Argens, about 40 m. n.e. of Toulon. It is charmingly situated, in the midst of a valley surrounded by hills, the slopes of which are covered with vineyards and olive plantations.

It is tolerably built; and its streets are adorned with numerous fountains and trees. Its principal structures are the prison, the court-house, a hospital, and a stately clock-tower. It has manufactures of coarse woollens, leather, hosiery, silks, soap, brandy, oil, and earthenware. Pop. '91, 9816. D. is an ancient place. During the middle ages it was strongly fortified. The fortifications were destroyed in the civil wars, but were reconstructed in 1615.

DRAINAGE, in husbandry, is the art of carrying off water from the soil and subsoil of land by means of open or closed drains or trenches—the term, however, is generally understood to apply to closed drains. By its means, the fertility of wet land has been greatly increased. When the drains are put in every 6 or 10 yards, it is called *furrow* or *frequent* draining.

The vast amount of capital which has been expended in D. within a quarter of a century, attests its utility and necessity. Before the introduction of furrow draining, stiff and tenacious clays were of comparatively little value. They were cultivated at much expenditure of labor, and the crops which grew upon them were influenced to a great extent by the variations of the seasons. A system by which wet and worthless land could be rendered dry and valuable, was an improvement so patent to practical men, that we need not wonder at its general adoption.

D. by open ditches was no doubt the first mode of freeing land from superfluous water. The Roman agricultural writers mention the good results arising from covered drains, which were formed of wood and other substances, which served so far to render the land dry. More than a century ago, a large extent of clay-land was drained at narrow intervals in Norfolk and Essex, by putting in brush-wood and even straw in the bottom of the drains. The progress of draining, which is now regarded in many soils as essential to economic culture, was slow and partial, until Mr. Smith of Deanston (well on in the 19th c.) reduced the practice to a system, and showed the principles upon which its efficiency depended. Through the exertions of this advocate, furrow draining soon became a *sine quâ non* in the culture of clay-soils, or indeed any soil, in moist climates.

Practical men consider the line of greatest fall, or quickest descent, as the best for cutting drains in a field. The smaller drains are usually conducted into larger or *main* drains, instead of each discharging its quota of water into the open ditch. This is rendered necessary, as the mouths of the smaller drains would be more liable to be choked up by the growth of weeds; while the collecting of water into main drains secures a fuller flow to sweep out any matters which might accumulate where the discharge was small. Moreover, the less of the action of the air in the drains, the more efficient they are.

The most efficient, and at the same time cheaply cut drain, is made so that a pipe of a cylindrical form may be laid along the bottom, which need be of no greater width than what is necessary to allow of the pipes being properly laid.

Drains of this form are cut with a set of spades which are of different widths—the broader being used for taking out the top, and the narrowest for the bottom. The one which cuts the last spit is called the *bottoming tool*, and its introduction has effected a considerable saving in cutting drains. The pick has often to be used, too, where the subsoil is hard. The cutting of drains is heavy, crushing work. Men employed at this sort of labor are generally paid by the piece; and a professional will make rather above the ordinary rate of laborer's pay. One not accustomed to drain-cutting finds it for some time very hard labor; but experienced hands prefer draining to trenching.

Before the general use of pipes, stones were the common materials with which drains were formed. Mr. Smith recommended that they should be broken so small, that they might pass through a ring two inches and half in diameter. From nine inches to a foot in depth was the quantity which was commonly put in. Where stones can be easily got, they are still preferred to tiles, as cheaper, and if well put in, more efficient and durable. The best plan is to set a pretty large block at each side of the bottom of the drain, and then use a third as a sort of wedge. A coating of smaller stones is surmounted by some turf and the muck.

When tiles and pipes were first used, it was ever thought necessary to have some gravel, or small stones, placed above them in the drains, for the purpose of enabling the water to find its way into them. It was soon found, however, that tile drains were quite as efficient without any stones or gravel; and that they were less liable to be choked up, as the clay or earth acted as a filter in preventing the intrusion of any kind of solid matter.

Many kinds of tiles and pipes have been tried, but the cylindrical form is most used. At one time, a bore in the tile of an inch in diameter was thought sufficient, but 2-in. tiles are now preferred. They are usually made about 15 in. in length. The continuity of the drain is maintained completely by *collars*, which should always be used as a means for securing efficiency and permanency. In soft mossy or clayey subsoils, semi-cylindrical tiles called mugs have been laid, with the bend up, on lath. This is expensive, but is necessary in some cases.

Much discussion has taken place in regard to the proper depth of drains, as well as the distance at which they should be placed. Mr. Smith at first advocated the making

of drains from $2\frac{1}{2}$ to 3 ft. deep, and at intervals of from 10 to 40 ft., according to the nature of the land. Experience, however, has been gradually favoring deeper drains, at wider intervals. Even on the most tenacious soils with subsoils of *till*, few now think of having drains less than 3 ft. in depth, though the distance apart should not in many cases be more than from 15 to 18 feet. The depth, however, depends greatly on the soil— $3\frac{1}{2}$ and 4 ft., with the leader drains 6 in. more, are common dimensions. In mossy land the depth has sometimes to be 7 feet. The width between drains depends on the wetness of the land and the character of the subsoil.

The mere tenacity of clays is not the element which determines the depth of drains, or the distance at which they should be placed apart. It is now well understood that the success of draining by pipes depends upon the fissures which are produced in the subsoil by the droughts of summer never entirely closing up; and thus minute channels are formed, which lead the water into the drains. As the properties of clays become better understood and classified, practical men come to be more at one in regard to this important point connected with the economy of drainage.

The principal advantages of D. are, the deepening of the staple soil, and rendering it more friable, so that a superfluity of water, which would cause the formation of those chemical compounds that are found in stagnant water, is prevented. The greater depth of mold, and more perfect culture, render the soil more absorbent of moisture in dry weather. As crops can usually be sown sooner on drained lands, they also ripen earlier, and produce more abundantly. In short, while drained land obtains a greater capacity for moisture and manure, it imparts to plants greater capabilities for economically working up the materials which they find in the soil and atmosphere, seeing they are maintained in the most healthy conditions of growth.

The advantage of D. consists in that rapid running off of the water which falls as rain, so as to admit of working lands without any undue delay, while natural springs and dampness, from whatever source arising, are also run away with wonderful success. Subsoil D. has been perhaps the most valuable improvement connected with agriculture. See *illus.*, AGRICULTURE, vol. I.; WATER STORAGE, ETC., vol. XV.

DRAINAGE-TUBES, in surgery, are a recent but important addition to the surgical appliances for which this profession is indebted to a distinguished French surgeon, M. Chassaignac. They are composed of India-rubber, from $\frac{1}{4}$ th to $\frac{3}{8}$ th in. in diameter, perforated with numerous holes, and of various lengths. They are especially useful in chronic abscesses (which it may be unadvisable to empty at once) and empyema (q. v.), but also in large wounds, such as those made by amputation, and in all cases where there is apt to be a deep accumulation of discharge. They are introduced in such a manner that one end is on a level with, or projects above the skin; the other is in communication with the seat of discharge; and by allowing that discharge constantly to escape from the external wound, they diminish both chemical irritation from putrid accumulation, and mechanical irritation from pressure. Like all new inventions, it has its advocates and opponents. Thus, while sir William Paget, in his article "Sinus and Fistula," in Holmes's *System of Surgery*, says that "*drainage*, for which the perforated caoutchouc-tube of M. Chassaignac is a very happy invention, is applicable to a great number of cases; but chiefly to those in which a sinus or incomplete fistula depends mainly on pus collecting at a level below or distant from the aperture of discharge, or more generally, when pus is apt to be retained."—Sir William Paget's surgical colleague at St. Bartholomew's hospital, in his article "Abscess," which immediately precedes that from which we have just quoted, objects to the drainage-tube on the grounds that, as a foreign body, it sets up irritation, and adds that "if a proper opening be made, there can be rarely any occasion for a drainage-tube; and however carefully it is inserted, it must of necessity inconvenience and distress the patient." Notwithstanding Mr. Coote's objections, drainage-tubes are now very generally used in surgical practice.

DRAKE, CHARLES DANIEL, b. Cincinnati, 1811; studied and practiced law; went to St. Louis, 1834; representative to the Mo. legislature, 1859-60; member of the state convention, 1863; presidential elector, 1864; member of the Mo. constitutional convention, 1865; U. S. senator, 1867-70; chief-justice, court of claims, 1870-85; wrote *Treatise on the Law of Suits by Attachment in the U. S.*, 1854; *Union and Anti-Slavery Speeches*, 1864; and many occasional orations. He d. in 1892.

DRAKE, DANIEL, 1785-1853; a physician; b. N. J.; graduated at the university of Pennsylvania, 1816. In 1818, he founded a medical college in Cincinnati; also a commercial hospital. In 1823, and following years, he was professor in medical colleges in Philadelphia, Louisville, and Cincinnati. He wrote *An Historical and Scientific Account of Cincinnati*; and *A Systematic Treatise, historical, etiological, and practical, on the Principal Diseases of the Interior Valley of North America, as they appear in the Caucasian, African, Indian, and Esquimaux varieties of its Population*.

DRAKE, Sir FRANCIS, was b. about the year 1539, in a cottage on the banks of the Tavy, in Devonshire. His father was a yeoman, and had a family of twelve sons. He was a zealous Protestant, and during the persecution under queen Mary, he fled from Devonshire into Kent, in which co. his family was brought up. He obtained some kind of clerical appointment among the sea-faring men of the district, and in consequence, D.'s younger years were passed among sailors. He was at an early age apprenticed to

a neighbor of his father's, who possessed a bark, and occasionally made voyages to Zealand and France. When his master died, D. fell heir to the vessel, and carried on the old trade with considerable success. While coasting about, he heard of the exploits of Hawkins in the new world, and the recital took such a hold of his imagination, that selling his ship, he proceeded to Plymouth, and joined Hawkins in his last expedition to the Spanish main. The adventure was disastrous to all concerned, and D. came home much poorer than when he set out. Undismayed, however, he gathered around him wild and reckless spirits, and having raised sufficient money, they fitted out a vessel, and under the command of D., made several voyages to the West Indies. In 1570, he obtained a commission from queen Elizabeth, and cruised in the West Indies, enriching himself with plunder. In 1572, he again sailed for the Spanish main, and, assisted by some other English ships, he plundered the town of Nombre de Dios. He then crossed the isthmus of Darien, and beholding the Pacific, prayed God to grant him leave to sail an English ship in that sea. On Sunday, the 9th Aug., 1573, he came into Plymouth laden with spoil; and when the news spread of his arrival, the people forsook the preacher, and came out to gaze on the brave and successful sea-rover.

Under the sanction of queen Elizabeth, D. again set sail in 1577, taking with him five vessels. He sailed to South America, and plundered the coasts. In Sept. of that year he entered the Pacific. During his voyage, he was singularly successful. He sacked the Spanish towns on the coasts of Chili and Peru, and he captured a royal galleon laden with plate. He then steered for the n.e., hoping to find a passage back to the Atlantic; but the severity of the cold discouraged his crew, and he took shelter in Port San Francisco. He stayed there several weeks, and formally took possession of the country in the name of the queen of England. He then steered across the Pacific for the Moluccas; reaching Ternate, he sailed for Java, thence he stretched right across the Indian ocean for the cape of Good Hope, which he doubled in safety, and arrived at Plymouth on Sunday, the 26th Sept., 1580. He was graciously received at court. Elizabeth banqueted on board his vessel, and conferred on him the honor of knighthood.

During part of 1585 and the whole of 1586, D. was employed, with a fleet of 21 ships, against Philip II. of Spain, chiefly in the West Indies and the coasts of South America. In this, as in his former voyages, he plundered many towns, and enriched himself with spoil. During this voyage, he visited Virginia, which colony had been recently planted by Raleigh. Thence he returned home, and it is said brought tobacco with him.

Spain was now preparing an armada for the invasion of England, and Elizabeth sent D. with a fleet of 30 sail to destroy the enemy's ships in their own harbors. He entered the roads of Cadiz, passed the batteries on the morning of the 19th April, 1587, and before night, destroyed 100 vessels, and possessed himself of immense booty. He then sailed along the coast, burning and plundering. He entered the Tagus, and flouted the marquis Santa Cruz, who was lying in that river with a large force of galleys. Having done all the mischief in his power to Spain, D., with that keen appetite for plunder which never forsook him, steered for the Azores, on the look-out for homeward-bound treasure-ships. He was fortunate enough to encounter a richly laden carrack, of which he took possession. On his return, he spent a considerable portion of his prize-money in supplying the town of Plymouth with water.

D. was next employed as vice-admiral in the fleet under lord Howard, which scattered the armada, and broke the naval supremacy of Spain. In 1589, he was sent to Portugal with a fleet, to expel the Spaniards, who had taken possession of that kingdom; but the expedition was unsuccessful. On his return, he was elected member of parliament for Plymouth. In 1595, along with sir John Hawkins, he was sent with a fleet to the West Indies. In the course of the expedition, the commanders quarreled. Hawkins died before reaching Puerto Rico. Attacking the place, D. received a repulse. Sailing away, he burned and plundered several towns. He came to anchor in Nombre de Dios, where a deadly disease broke out among the soldiers and sailors of the fleet. D. was at last smitten, and after struggling 20 days with the malady, he expired on the 28th Jan. 1596. On the day of his death, the fleet anchored at Puerto Bello, and there the bold sailor and buccaneer received his sea-funeral. See *Life* by Froude (1889).

DRAKE, FRANCIS SAMUEL, 1828-85, son of S. G. Drake. His most important work is his very full *Dictionary of American Biography, including Men of the Time* containing 10,000 notices of persons of both sexes of native and foreign birth, who have been remarkable or prominently connected with the arts, sciences, literature, politics or history of the American continent.

DRAKE, FRIEDRICH, a celebrated German sculptor, b. at Pymont, 23d June, 1805, and trained under Rauch of Berlin. Among his principal works are a "Madonna with her Infant" (purchased by the empress of Russia), a "Dying Soldier," a "Vintager," "The Eight Provinces of Prussia" (colossal allegorical figures, adorning a hall in the royal palace at Berlin), and a "Warrior crowned by Victory," which is reckoned one of the masterpieces of Prussian sculpture. But D. owes his celebrity chiefly to statues, busts, and medallions. There are few great countrymen of his of whom he has not preserved a marble memorial. His statues of Schinkel, the two Humboldts, Rauch, Justus Moeser, his bust of the naturalist Oken, his two colossal statues of Frederick-

William III., king of Prussia, and that of the emperor William I. at Cologne, deserve especial mention; as also the busts of Bismarck and Moltke, and the figure on the victory column at Berlin. D., who was prof. of sculpture in the academy of fine arts at Berlin, d. 1882.

DRAKE, JOSEPH RODMAN, 1795-1820; born N. Y.; one of the early American poets. He studied medicine, graduated, and married a daughter of Henry Eckford, the ship-builder, an alliance which raised him from poverty to affluence. In 1816, he wrote *The Culpriit Fay*, a highly imaginative poem. In 1818, he was in Europe. The next year, in conjunction with Fitz-Greene Halleck, he wrote poetical satires for the *New York Evening Post*, over the signature of "Croaker and Co." He is best known as the author of *The American Flag* (of which Halleck is said to have contributed the last four lines), which many critics consider to be our best national poem.

DRAKE, SAMUEL GARDNER, 1798-1875; born N. H.; in early life a school-teacher. In 1828, he established in Boston an antiquarian bookstore, the first of the kind in the country. He was one of the founders of the New England historical and geological society, of which he was president in 1858. In 1847, he started a quarterly *Register*, of which he was for many years the editor. Among his publications are a number of books on Indian history and wars, on genealogy, and on witchcraft.

DRAMA (Gr. *drama*, from *draō*, I act), or dramatic poetry, in its most general signification, represents *actions*, which are not stately narratives, as in epic poetry, or which do not aim at the musical expression by language of mental emotions, as in lyric poetry. The D. consists of an impersonal representation, by the dramatist, of an animated conversation of various individuals, from whose speech the movement of the story is to be gathered. Thus, it is contrasted, on the one hand, with dialogue, or the dull and changeless flow of discourse, and on the other, with every other species of poetry, whether epic or lyric. In simple dialogue, the minds of the speakers remain unchanged; in the D., the movement of the thoughts is so lively, and the expectation of the issue so vivid, that this species of poetry surpasses every other in interest and in intensity. In epic poetry, persons are frequently introduced engaged in lively conversation, and this is sometimes the case even in lyric poetry, but the prevailing tone of the epopee is descriptive and indirect. A novel, or an epic poem, can only be described as dramatic when it abounds in animated conversations, or when direct action prevails over description. All dramatic poetry may be divided into *tragic* and *comic*. Tragic poetry has for its aim to interest the earnest mind, while comic poetry merely endeavors to produce amusement. Tragic poetry may be described as that which interests the mind in the highest degree possible, and comic poetry as that which engages it in the most complete lawlessness. In comedy, gloom, sadness, sobriety have no recognized existence; while in tragedy, gayety, joviality, riotous mirth are unknown.

While the D., doubtless, arose from that natural love of imitation peculiar to man, and from the child-like liveliness with which a simple narrator loves to recount anything which he has heard or seen, yet the creation of dramatic composition was, nevertheless, a feat of singular boldness. This arises from the wide difference there is between the disjointed elements of occasional imitation and the perfect invention of the genuine drama. The Old Testament, no doubt, contains numerous instances of dramatic dialogue, as in the book of Job; and of lyric poems placed in a dramatic connection, as Solomon's Song; but there is no instance in Hebrew literature of the existence of the D. properly so called. The Hindus have an early dramatic poetry, but, unfortunately, this poetry only dates back to a time when the intercourse between Greece and India was close and frequent. It is to Greece alone that we, accordingly, must look for the invention of the D., and to Athens, in particular, for its perfection. But even here it was originally exhibited only at a few festivals of a single god, Dionysus. There can, then, be no doubt that the origin of the D. is to be sought for in the enthusiasm attendant on the worship of Bacchus. The ancient Greek writers tell us that the D. originated in a choral song; and Aristotle (*Poet.* 4), that it had its origin in the singers of the dithyramb. Supposing that it originated in the pantomimic dances, the dramatic art, like every other, was only slowly purified from extraneous mixtures. Even the origin of the word tragedy has been disputed, although the inventor of it, Arion (580 B.C.), the celebrated dithyrambic poet, is known. Tragedy (*tragōidia*, from *tragos*, a goat, and *ōidē*, a song) is said to have taken its rise from the fact of the old dramas being exhibited when a goat was sacrificed, or because a goat was the prize, or because the actors were clothed in goatskins. Comedy, again (*kōmōidia*, either from *kōmos*, a revel, or *kōmē*, a village), signifies, literally, either the *revelers' song* or the *village song*, from the practice of strolling-players publicly exhibiting their dramatic skill about the streets. Thespis (536 B.C.) introduced the regular dialogue into the choral representations, and joined a person to the dithyrambic songs, who was the first actor. Phrynichus (512 B.C.) used this single actor of Thespis for the representation of female characters, although with him the lyric element predominated over the dramatic. No further improvement of any note was introduced into tragedy before the time of Æschylus.

Comedy, again, arose about 580 B.C., with Susarion, who traveled about through Greece, ridiculing, from a small movable stage, the follies and vices of his time. Tragedy, from its first recognition, was deemed worthy, by reason of its superior

gravity and staidness, to entertain the refined inhabitants of cities; while comedy, at the outset, from its riotous fun and jollity, was judged more in harmony with the rustic habits of the country people. In time, comedy made its way into the city, and Epicharmus (485 B.C.), besides modeling this form of dramatic wit, after its more successful rival, tragedy, likewise introduced a number of distinguished comedians to the notice of the Athenians. Phormes, Magnes, Crates, Cratinus, Eupolis, Pherecrates, and Aristophanes are the highest names in connection with the old Greek comedy, the last mentioned being, however, by far the greatest. Tragedy, both from its ideal character, and from the stately cothurnus and long masks in which the actors of it appeared, aimed at a representation of what was dignified, noble, and grand in human nature. Comedy, again, from its style of caricature, its low-heeled sock, and its grotesque masks, tried to degrade humanity beneath its natural level. Comedy, during the Greek period of its history, divides itself into three forms, viz.: old comedy, middle comedy, and new comedy. The old comedy is the directly opposite of tragedy; its form is essentially sportive, and a seeming aimlessness reigns throughout it. It is, in the opinion of A. von Schlegel (*Lectures on Dramatic Literature*), the only genuine poetic species of comedy, while the other forms of it show a tendency to decline into prose and matter of fact. In the new comedy, again, the form is rather serious than otherwise, and it is regularly tied down to the accomplishment of a certain aim. This is what is understood by comedy at the present day. It is a mixture of tragedy and comedy proper, of earnestness and mirth. Only fragments of Menander and of Philemon, the genuinely witty poets of the new comedy, have come down to us. The middle comedy, again, which came in between the old and the new, arose after the termination of the Peloponnesian war. The new oligarchy strictly prohibited the introduction of living persons by name on the stage; and the chorus, till then the chief instrument of vituperation, is said to have been abolished.

With Æschylus, Greek tragedy properly begins. He instructed his actors himself in the rehearsal of his pieces. In his dramatic compositions he aimed more at sublimity than beauty, more at the heroic than the human. Sophocles, again, who was, perhaps, superior to Æschylus in his appreciation of human nature, strove more to depict idealized men than to paint heroic excellence. He introduced a third actor on the scene, and materially improved the mechanism of the stage. Euripides was too much of a nice speculator to attain to the highest forms of poetic expression. Instead of quietly contemplating life as Sophocles did, he seems to have been morose and peevish; but in point of moral denunciation, no dramatist surpasses him. With these three great poets, Greek tragedy may be said to close. With them it ceased to be the tragedy which Aristotle has described in his celebrated definition of it. "Tragedy," he says (*Poetics*, 6), "is the imitation of some action that is serious, entire, and of a proper magnitude; effecting, through pity and terror, the refinement of these and similar affections of the soul." In the hands of the subsequent authors this form of the D. grew lax and effeminate, and in the performances of Theodectes especially, tragedy was made to give way to rhetoric. (See the works of Böckh and Welcker on the Greek tragedians; also, Müller's *Literature of Ancient Greece*.)

The Romans were not a great dramatic people. They borrowed, according to the common account, during a period of national despondency occasioned by a desolating pestilence (A.U.C. 391), their first idea of a play from the Etrurians; their effusions of sportive humor, their *Fabule Atellanæ*, from the Oscans; and the higher class of dramatic compositions from the Greeks. Philology, likewise, countenances this story; for *histrio*, the Latin word for a player, is pure Etruscan. No remains of any note have come down to us of the comic writers of Rome, except Plautus and Terence. The former was a poor day-laborer, the latter a Carthaginian slave. The habits of each appear in their writings. Plautus has a degree of rough vigor and broad jocularly, born of the hand-mill and the plow, while Terence is more refined and delicate in his wit and characterizations. Both these writers borrowed largely from the Greeks. Of the early period of Roman tragedy no remains exist, but it is probable that its poets were merely translators or imitators of Greek models. The tragedians of the Augustan age were ambitious of rivaling the Greeks. Unfortunately, none of these grand attempts have come down to us, except ten bombastical and frigid dramas, that go under the name of Seneca.

Ancient art fell with pagan Rome. In the early ages of Christianity, any one connected with the theater was not allowed baptism. The unwise zeal of the fathers was followed by an edict of the emperor Julian to the same effect. The two Apollinarii, father and son, and Gregory of Nazianzen, attempted to introduce religious plays or mysteries, drawn from the Scriptures, to amuse the Christian people during the operation of Julian's law. In a short while, instead of the D. proper, there was nothing to lighten up the surrounding darkness but such productions as the saturnalian pageants, the Feast of Fools and the Feast of the Ass.

The Italians are the first people of Europe, who, after the long sleep of the true dramatic spirit in the middle ages, strove to enkindle the ancient fire upon Roman hearths that had for long years been cold. Early in the beginning of the 16th c., the first regular modern D. was published. It was called *Sophonisba*, and the writer was a very commonplace author, by name Trissino. Shortly after, this tragedian was followed by

Ariosto, by Babbiena, and by Macchiavelli, all distinguished cultivators of the classic comedy. Towards the end of the century, Giambattista de la Porta, philosopher and comic writer, exhibited a number of pieces of a familiar, and sometimes even farcical kind, but full of happy invention and agreeable originality. The political influence of Spain was now at its height on Italian territory, and the romantic D. of the west gradually found favor in Italy. Even so early as 1529, Ricchi had attempted to overthrow the classic taste in Italy, but without success. It remained for Borghini, Oddi, and M. A. Buonarroti, the nephew of the great artist, and one or two other writers, to break in upon the current taste, and to do much to introduce the romantic D. in Italy. In the 17th c., Rinuccini, by the union of music with the romantic D., succeeded in establishing the *melodrama*. Tragedy and comedy were now entirely laid aside as antiquated, and nothing but the *musica opera* was heard of from Milan to Ravenna. Maffei led the way in reforming the Italian stage. The political preponderance of Spain had now given way to that of France, which facilitated his labors not a little. His *Merope* is a fine attempt to restore the tragic D. to Italy, but as Lessing says of it, in his *Dramaturgie*, it is rather the production of a "learned antiquary" than of a great tragic poet. The musical D. had now to be rendered classic, and this task was undertaken by Zeno and Metastasio. The latter, who has all the attractiveness for the Italians that the classic Racine has for the French, by subtle harmony and grace in his songs, by his power of painting pathetic situations, and by his melting effeminacy of manner, charmed the hot southerners as no other poet yet had done. After Goldoni, a great comic authority in Italy, and a careful student of Macchiavelli and Molière, except Riccoboni and Gozzi his rivals, we have few dramatists of any note till we come down to last century. The bold and passionate Alfieri inaugurated a new era in Italian tragedy. He is a follower of the classic school, and a strict observer of the Aristotelic unities. His successors have relaxed more their adherence to classic forms, and have produced some very admirable dramas. Among the most estimable of those writers are Monti, Manzoni, and Niccolini.

In the other European nations as soon as dramatic composition rose to any degree of purity, it became thereby disconnected with the church. But in Spain this is by no means the case, for their best poets, while writing for the stage, have busied their pens in the composition of religious dramas. Passing over the names of Villena, Santillana, Naharro, and Rueda, as diligent but comparatively weak builders of the fame of the Spanish D., we come to the periods of Cervantes, of Lope de Vega, and of Calderon, when the Spanish stage may be regarded as in its best condition. In his *Numantia* particularly, Cervantes, whose genius was more decidedly epic than dramatic, has left to the world a specimen of tragic invention and of moral dignity which it is not likely to forget. While the critics were clamoring about the classic rules and the Aristotelic unities, Lope de Vega appeared on the scene, to set nearly all the dramatic laws at defiance. He is the most fertile dramatic writer in the world, besides being one of the best. Yet he prostituted his pen to serve the public, and sacrificed his future fame to his living popularity. Calderon, who succeeded him, possessed all his advantages, with the important additional merit of being thoroughly devoted to dramatic art as to a mistress. So great was Calderon reckoned in the composition of religious plays, that by letters-patent he enjoyed a monopoly of these productions for 37 years. The brilliant period of the Spanish theater, comprising the first half of the 17th c., had with the death of Calderon well-nigh closed. Except Moreto, Tirso de Molina, and Solis the historian, there is no writer of any note to engage the attention.

We come now to France, where the unities, as they are called, have been observed with as much strictness as if the country had been an old Grecian province. This is chiefly owing to the influence of the criticisms of Boileau, who adopted the dramatic unities in all their severe rigor. The critics of other nations, particularly of Germany and of England, have chosen to condemn this exposition of the D., and sometimes to despise even the Stagirite as a dramatic critic. The dramatic unities are threefold—action, time, and place. According to the French, these unities have the following significance: 1. That the action of the D. must be one—that is, that the interest or attention must not be distracted by several plots, but everything must be subservient to the main action. 2. That all the actions must take place on the same spot, or very nearly so, in order that the illusion may not be disturbed; and 3. Everything should happen on the same day for the same reason. Much has been written for and against these rules. Suffice it to say, that these are the landmarks on which the classic dramatist fixes his eye. Previous to Jodelle, or indeed to Corneille, hardly any progress had been made in the regular D. in France. A number of writers, of more or less ability, had produced *mystères*, *soeties*, *moralités*, *farces*, in which, in numerous instances, the romantic or anti-classical tendencies of human nature had manifested themselves; but neither in the case of the brethren of the Passion, nor in the case of the *Enfants sans Soucis*, was there any progress made in the proper business of dramatic composition. Jodelle was the first writer who composed a regular five-act tragedy, and he publicly exhibited it in the presence of the court of Henry II. of France. He composed other pieces of equal, many of superior, merit, but nothing of any importance in the D. appeared before the time of Corneille. This writer, who appeared in the reign of Louis XIV., during the time that the star of Richelieu was in the ascendant, had to humor the court by humor-

ing the academy, and to please the academy he required to observe the rules of Aristotle. He produced seven plays, as cold and as severe as if they had been written by Sophocles, but of great elegance and dignity of style, when it struck him that he might give more free scope to his romantic tendencies in the tragedy of the *Cid*. All Paris rang with its praises, but the academy gloomed, and poor Corneille had to betake himself again to the dignity and severity of the Greek drama. He got what he longed for, however—a seat among the members of that institution which had been so instrumental in repressing the spontaneous outflow of his genius. It was more than his successor, Molière, obtained, who insisted to the last on playing his part as well as penning his pieces—an abuse which the dignified academicians could by no means tolerate. The genius of this dramatist was decidedly comic, and it may perhaps be questioned, whether, in all the essentials of true comedy, Molière's is not the very foremost name in the history of the stage. He borrowed much from the Spaniards, though perhaps less than Corneille; a great deal from the Latins; and more perhaps from the Italians. But the favorite tragic poet of the court of Louis XIV. was Racine. His genius lay decidedly towards the serious and the exalted, so that he had no temptations, like Corneille, to trespass the bounds of the academic proprieties. In tenderness and elegance, all French writers give way before him. In his *Athalie*, his last and best D., he gave to the Parisian public a composition, such as in breadth, in elegance, and in severe grandeur, it could nowhere find out of the Greek theater. But we must push through the crowd of lesser lights which shone on the decline of Racine and Molière, and glance at that bright and fitful luminary—Voltaire. He pressed boldly forward, and astonished all Europe with the force and power of his romantic dramas, a style of composition which, since the *Cid* of Corneille, had been altogether excluded from the theater. His spirit of intolerance was perhaps felt in his dramas, and his increasing warfare with superstition and fanaticism was too distinctly experienced even in the theater. But his genius and spirit have earned for him a place beside Corneille and Racine as one of the tragic names whom France delights to remember. Boursault, Regnard, Legrand, Lemercier, Victor Hugo, Dumas, and Alfred de Vigny, would all require to be noticed in a full view of the French drama.

The German D. is almost wholly dependent for its fame on the names of Lessing, Goethe, and Schiller. For while Rosenpluet, Hans Sachs, and Ayer were original, and some of them fertile; while Gryphius, Gottsched, Gellert, and Schlegel show a decided advance in the appreciation of the laws of dramatic composition; yet from the feebleness of the writers, and from the backward state of theatrical taste in the end of the 17th and the beginning of the 18th centuries, very little was done towards a clear and distinct recognition of the excellence of dramatic literature, till the critic Lessing, in his *Miss Sara Sampson*, taught Germany to appreciate the productions of the romantic drama. As a critic, he blamed the French, praised Shakespeare, and professed belief in Aristotle. He held more than one dramatic heresy, and his antipathy to versification was among the number. Goethe is, without doubt, one of the greatest geniuses which the world has seen, but whether he is entitled to so high a place for his theatrical dramas remains an open question. As his aim was more emphatically the culture of his genius in its fullest form, the circumstance of his writings assuming the dramatic form is rather an accident than otherwise. From first to last he seems to have been distinctly aware of this, and in the prologue to his last, and by far his grandest production, he declares why he could not accommodate his genius to the demands of a mixed theater. Yet his *Faust* must ever be regarded as one of the grandest and most remarkable compositions which modern Europe has witnessed. Schiller was more expressly the dramatic poet of Germany than Goethe. While Goethe's genius was fuller and more complete, Schiller made up for what he wanted in breadth of vision by the moral intensity of his genius. From his wild play of the *Robbers*, down to his last D. of *Wilhelm Tell*, he worked with a vehemence such as has very seldom been witnessed. But he filled Germany, and indeed all Europe, with his tragic fame, and his name is one which "posterity will not willingly let die."

Dramatic exhibitions in England, if they did not originate in the church, were nevertheless speedily appropriated by the clergy. Ecclesiastics were frequently the composers of the religious pieces, or mysteries, and they were found not seldom to be the actors. The mass of the people, no doubt, owed a good deal of grotesque amusement, and even of occasional information, to the Biblical and legendary history, which those rude attempts at the D. were fitted to convey. Those old religious plays are generally divided into two classes—*miracles* or miracle-plays, and *moralities* or morals. The former were founded on Scriptural narratives, or on the legends of the saints; the latter arose from the former, by the increased introduction of imaginary features. These pious pastimes existed long before the reformation, and were not overthrown by that great revolution in the opinions and beliefs of the country. See MYSTERIES. It was about the middle of the 16th c. that the D. extricated itself completely from these ancient fetters. By this time both comedy and tragedy had begun to exist in a rude reality in England. The oldest known comedy (before 1557), that of *Ralph Roister Doister*, was written by Nicholas Udall, a school-master of considerable learning, probably about the middle of the 16th century. Ten years after appeared our first tragedy, known variously as *Gorbudoc*, or as *Ferrex and Porrex*, by Mrs. Norton and lord Buckhurst. And not only is this work the earliest tragedy in our language; it con-

ains, beside, the first application of blank verse to dramatic composition. But the play is dull, heavy, and declamatory. The D. lingered in this incipient condition until very near the time of Shakespeare. Bishop Still's *Gammer Gurton's Needle* is no improvement on *Roister Doister*. The names of Kyd, Lodge, Greene, Lyly, Peele, Marlowe, Nash, etc., must pass before us almost without comment. Many of these writers are not without their merits, particularly Marlowe, whose plays of *Edward II.* and of *Dr. Faustus* are acknowledged by Charles Lamb to contain passages that Shakespeare himself has not surpassed. Marlowe, besides, is the first author who introduced blank verse upon the public stage. But all these dramatists are obscured by their nearness to the great luminary of the English drama. Shakespeare is now almost universally acknowledged to be the greatest dramatic genius that has ever appeared in the world. He brought the romantic D. to a perfection which it is not likely to surpass. His writings present the finest example of the depth, sublimity, refinement, and variety of which the D. is capable; and they are abundantly marked by those peculiar characteristics which sprang from the union, in the person of its author, of such wonderful powers of conception with such familiar experience of theatrical management. Of course he despised the unities, or rather, we might say, he worked in ignorance of them, for he knew nothing of Aristotle and Boileau; and the rest of the French critics were not born when he died. Hence his D. is known in literature as "irregular;" and, we fear, human nature is likewise very irregular. The poet trusted to his own instinctive judgment, and of its exercise we have all fortunately plenty of examples. The principal of Shakespeare's contemporaries are Ben Jonson, and Beaumont and Fletcher. Like Shakespeare, Jonson wrote both tragedies and comedies. Milton speaks of "Jonson's learned sock," and thus hits off the main feature of his character as a dramatist in a phrase. Beaumont and Fletcher, who were, like many brotherly men in that age, joint-workers, have the honor of standing next to Shakespeare in the romantic D. of England. But, like Lope de Vega, they wrote too much for the mere success of the moment to be ranked in the foremost file of England's dramatic writers. With Massinger, Ford, and Shirley, the old English D. is closed. Dryden, the literary chief of his age, who flourished during the latter half of the 17th c., wrote some fine pieces of Frenchified declamation. Lee, and the unfortunate Otway, bring down the D. to the beginning of the 18th century. For, while Gay, Congreve, Cibber, Wycherley, Vanbrugh, and Farquhar, all display considerable dramatic spirit and invention, their works are, nevertheless, morally considered, the foulest things in the language. They paint well the externals of society, and have left behind them good specimens of the "comedy of manners," as it has been called; but vice is both warp and woof of nearly everything they have produced. Addison, Johnson, Young, Thomson, etc., wrote some good poetry, but poor dramatic verse; while Lillo, Moore, Garrick the actor, Goldsmith, the Colmans, and Cumberland, nearly all took to prose instead of verse. They produced agreeable comedies, but nothing of a very marked kind in the history of the D. appears until the time of Sheridan who gave an impulse to "genteel comedy," such as has placed him ever since at the head of the writers of that species of composition. Holcroft, Mrs. Inchbald, "Monk" Lewis, and Maturin, mostly influenced by inferior German writers, have left behind them a legacy of terror and of wonder fit to render their period marvelous, if for nothing else. Joanna Baillie and Sheridan Knowles remind the reader of the excellences of the old English D., and the *Lady of Lyons* of Bulwer Lytton is a favorite with playgoers of the present day. Byron, Coleridge, and Henry Taylor are the authors of fine meditative dramas, but they are more suitable for the closet than for the stage. Our sketch would not be complete without allusion to Talfourd, Jerrold, Shirley Brooks, Marston, Tom Taylor, Charles Reade, Robertson, Wills, H. J. Byron, and Gilbert. Swinburne, Tennyson, and Browning have also written works in the dramatic form.—See Ward's *History of English Dramatic Literature* (London, 1875), and works by Collier, Fitzgerald, and Archer.

American Drama.—In the United States it is difficult to separate the English and American drama. The sameness of language, the similarity of dramatic themes, and the free and constant intermingling professionally of American and English artists, make a homogeneous whole rather than separate branches. The literature of the drama in the United States is very extensive; but, as in England, a great proportion of it is of little value. It was some time after the establishment of independence before the dramatic muse began to work; and the earliest productions were naturally based upon our warlike achievements, the glories of our battle-fields, the invincible courage of our heroes, and the ignominious defeats of the enemy. It scarcely needs be said that such dramas, following like shadows upon events so recently passed, were veritable trash, not only in a literary but in an acting view. Centuries must roll by ere Lexington, and Saratoga, and Yorktown can become fit subjects for dramatic treatment. Shakespeare's historical plays took little hold of the English public until Garrick entered into the body and soul of Richard III., three hundred years after Bosworth field and a century after the death of the swan of Avon. The first theater to open after the departure of the British troops was that in John street, New York, 1785. All the players of note were English, and so were the plays. The first play by an American author presented on the stage was *Contrast*, written by Royal Tyler, afterwards chief-justice of Vermont. It was a poor affair, but served to introduce to the boards that abomination known as the

exaggerated "Yankee," which could not be banished for three quarters of a century. William Dunlap was the first prolific American dramatist, some of whose work was fair for the period, while much more of it was poor. He produced about fifty plays, some of which were translated from the German. The building of the Park Theatre, New York (opened Jan. 29, 1798), gave the drama a fresh start, although all the chief players were from the old country, and the opening play was *As You Like It*. On Jan. 24, 1809, "the American Roscius" made his début on the Park stage as "Young Norval," following with more solid characters. This lad was John Howard Payne. He wrote and translated a number of plays, of which his own tragedy *Brutus, or the Fall of Tarquin*, still keeps the stage. It is a powerful, well-constructed tragedy, and bears comparison with those of any English writer excepting only Shakespeare; moreover, it is the first drama of importance written by an American author. It was not until about 1820, that literary and cultured people began to look with favor upon the drama. The Park Theatre was burned in May of that year, but was rebuilt and opened in Sept., 1821, when Charles Sprague, then among the foremost of native poets, wrote the inaugural address, and Samuel Woodworth, another poet of high standing and also a dramatist, wrote the prize poem. Soon after this period, play-houses began to multiply, and the solid phalanx of English artists was now and then broken by the invasion of American players, none of them, however, destined to achieve greatness. There were some who rose to local celebrity; such as Rosalie Pelby, Anne Jane Henry, Caroline Placide, Alexina Fisher, then a mere child, and Julia Wheatley, a singer. Further impetus was given to the American drama by the presence of the great tragedian Edmund Kean, who played two short engagements in New York and Philadelphia. Opera also began to appear in force under Signor Garcia and his daughter Felicité, afterwards the renowned Malibran. In 1826, James K. Hackett made his first appearance as "Sylvester Daggerwood." He became famous in "Falstaff" and "Monsieur Tonson," in Yankee parts, and especially in "Sir Harcourt Courtly." Kean was hardly gone when Edwin Forrest made his first effort in a Shakespearean part as "Othello," June 24, 1826. Forrest is held in memory by a large majority of his countrymen as the greatest of American tragedians. The two Wheatley families (one English and one American) were coming into prominence about this period. Forrest, always intensely American in feeling, undertook to infuse the native idea into his work. He appeared in John A. Stone's *Metamora* (written for Forrest), and especially engaged Dr. Bird of Philadelphia to write a new play. The result was *The Gladiator*, a Roman episode removed as far as possible from this new world. Bird also wrote *Oraloosa*, another Indian piece. Stone was a native of Massachusetts, and the author of *Fauntleroy*; *Tancred of Sicily*; *Laroque, the Regicide*; and other dramas. He committed suicide when but 33 years of age. In 1830-31, two noted delineators of Yankee parts appeared in Danford Marble and George H. Hill, and were popular in a low grade of plays for many years. The season of 1832-33 brought over Charles and Fanny Kemble, who enjoyed immense popularity. The year before, the celebrated Ravel family had taken the people by storm, but they had no connection with the drama. In the spring of 1833, again appeared the great and erratic Booth, father of Edwin. He had appeared first in the United States, Oct., 1821. "Master Burke," or Charles S. T. Burke, one of the best of American comedians, appeared in 1836. In the same year, Misses E. and J. Anderson, granddaughters of the first Joseph Jefferson, made a successful beginning. The first became successively Mrs. Thoman and Mrs. Saunders, and the other Mrs. Gernon, mother of Effie, artists by birth. Nathaniel H. Bannister, a native of Delaware, started in 1813, and acquired considerable reputation, both as actor and dramatic author. Then came a mere boy, at the obscure National theater, one destined to be the foremost of American comedians—Joseph Jefferson, son of Joseph, grandson of the first Joseph, and half-brother of Charles Burke. These great artists illustrate the truth of hereditary transmission. About this time, James E. Murdoch, a Philadelphian, began to make his mark in tragedy. In 1836, appeared Miss Jean Margaret Davenport, an infant phenomenon. She became the wife of Col. Frederick W. Lander, and during the war between the states she was a devoted nurse in the hospitals of the union army. Charlotte Cushman, the greatest of American actresses, now threw the light of her powerful genius and individuality upon the stage. In 1838, Mary Cecilia Taylor ("our Mary") made her début, and became perhaps the most popular favorite ever known in New York city—a very clever and versatile though not a great actress. "The Shaws," as three talented sisters were called, were now coming prominently forward. They were Regina (first, Mrs. Charles Howard, and then Mrs. H. Watkins), Mary (first, Mrs. Fogg, and then Mrs. Krollman), and Josephine (first, Mrs. Russel, and then Mrs. John Hoey). All had more than ordinary talents, and were great favorites. Edward Eddy, b. in Troy, N. Y., appeared in 1839; a very heavy tragedian and melodramatic actor. In the same period came Joseph Proctor and his wife (Miss Hester Warren). John Gilbert first appeared in New York in 1839, and has ripened into the most accomplished "old man" on any stage. He was born in Boston in 1810, and made his début there in 1828.

Thus we struggled on with English plays and English players, except as above mentioned, until John Brougham, an Irishman, came over (in 1842) to stay. He was the first author to put life into the play-bills. Though not born here, his work was essentially American, especially those inimitable burlesques, *Pocahontas* and *Columbus*. He was also the best Irish and general comedian of the day. In June, 1844, a bright par-

ticular star appeared in the person of Anna Cora Mowatt, who was for several years the reigning favorite in genteel comedy and light tragedy.

In the second half of the present century the annals of the American stage have been filled with names that justly receive honor as those of admirably trained artists in every department of dramatic study. In tragedy, it is only necessary to recall Edwin Forrest, already mentioned, Edwin Booth, the most scholarly and thoughtful of American actors, John McCullough, best remembered for his manly impersonation of Virginius, Edwin Adams, whose premature death cut short a career of the greatest promise, and Lawrence Patrick Barrett. In legitimate comedy John Gilbert and Joseph Jefferson led the way, and were followed by Lester Wallack, William J. Florence, John T. Raymond, William Davidge, John Drew, F. S. Chanfrau, W. J. Lemoyne, James Lewis, and W. Leclercq. Of late the popular taste has turned to comedy of a somewhat lighter and more farcical character than of old, and many extremely clever and versatile impersonators have answered the demand. Of such comedians the best known names are those of Henry E. Dixey, whose natural ability leads one to regret that he has not chosen legitimate rather than farce-comedy, Neil Burgess, Edward Harrigan, famous for his Irish-American character sketches, William H. Crane, John Wild, Francis Wilson, Jefferson de Angelis, M. B. Curtis, Eugene Canfield, Mark Smith, De Wolfe Hopper, N. C. Goodwin, and Willie Edouin. Of talented and accomplished women, the American stage is proud to claim many who have now a fame that is truly international. Such are Miss Mary Anderson (q.v.), most successful in such rôles as "Galatea," "Juliet," and "Rosalind," and Miss Ada Rehan (q.v.), who stands by universal consent at the head of American comédiennes. Scarcely less known names are those of Mrs. D. P. Bowers, Charlotte Cushman, Madame Ponisi, Mrs. J. H. Gilbert, Charlotte Thompson, Matilda Heron, Mrs. W. J. Florence, Clara Morris, Rose Coghlan, Grace Henderson, Annie Russell, Enid Leslie, Louise Dillon, Maggie Mitchell, Mrs. Yeamans, "Lotta," Annie Pixley, Isabelle Irving, Annie Robe, and Caroline Hill.

The American stage has, in fact, always been much stronger in native players than in its native playwrights. This has been largely due to the absence until 1891 of an international copyright. A manager could always adapt, translate, or reproduce outright at no expense and little risk, a play that had met success abroad; whereas, to purchase one from a native writer involved at the outset a definite outlay, and the subsequent risk of failure. In the list of those Americans who have nevertheless met a complete or partial success in the face of this discouragement may be mentioned David Paul Brown, N. P. Willis, Julia Ward Howe, George H. Boker, Epes Sargent, John A. Stone, Robert M. Bird, Lester Wallack, H. H. Boyesen, Henry Guy Carleton, Steele Mackaye, Bronson Howard, Bartley Campbell, and Mark Twain. Mr. Augustin Daly (q.v.) has shown great cleverness in adapting from the German, many light comedies that have been so thoroughly Americanized as to seem original compositions. The fun-loving public has been made to laugh at the eccentric and uproarious, but perfectly clean and wholesome farces of Mr. Charles H. Hoyt, who in *A Midnight Bell* (1888) has shown a capacity for higher things. Mr. Edward Harrigan has inimitably portrayed certain phases of low life in New York in his well-known series of plays. Mr. H. C. De Mille and Mr. David Belasco are equally successful in what is popularly known as the "society drama." But probably nothing that the American stage has yet seen is so racy of the soil, and so thoroughly and truly national, as the two plays evolved by Mr. Denman Thompson (q.v.), *The Old Homestead* and *Joshua Whitcomb*. From a literary point of view, these dramas of New England life are seriously defective, but their exquisite truth, their genial humor, and their simple fidelity to nature, have charmed both the general public and the most exacting and scholarly of critics.

To Mr. Augustin Daly, the American stage owes a debt that will always be most cheerfully acknowledged. To him is due the maintenance and training of a company that may without fear of contradiction be ranked with the best of the companies that in Europe are subsidized by the state and encouraged by feelings of national pride. Never before has our country felt and understood the possibilities of the dramatic art, as it has done since Mr. Daly in his Shakespearian revivals revealed them. The absurd "star" system, by which one great actor or actress was expected to atone for the shortcomings of a supporting company of incapables, has received its death-blow now that the public has learned how much of the success of any play depends upon the *tout ensemble*—the proper adaptation of one part to another, the intelligent comprehension of the whole, and the subordination of each character to artistic completeness. America may well be proud of the enthusiastic verdict of both the German and the English press upon the exquisite art of this admirable company of comedians.

For a fuller treatment of matters relating to the drama, the reader is referred to the articles that deal with the individual actors and authors mentioned above; to the articles (THEATER; COMÉDIE FRANÇAISE; and to the following works of reference: *The Stage and its Stars* (40 pts., 1888—); Donaldson, *The Theatre of the Greeks*, 8th ed. (1875); Wright, *The Second Generation of English Professional Actors* (1883); Matthews, *The Theatres of Paris* (1880); French, *Dramatists of the Nineteenth Century*, 2d. ed. (1891); Brereton, *Some Famous Hamlets* (1884); Fitzgerald, *A New History of the English Stage* (1882); Seilhamer, *History of the American Theatre* (1889); Hennequin, *The Art of Playing* (1890).

DRAMATIC WORKS, COPYRIGHT IN. See **COPYRIGHT.**

DRAMMEN, a seaport town of Norway, on both sides of the river Drammen, which here discharges its waters through the Drammen fiord into the gulf of Christiania, about 24 m. s. w. of Christiania, with which it is connected by railway. D., which is built in a valley, is divided into three quarters—Bragenes on the n. bank of the river, and Stromsøe and Tangen, on the s., united to the first-mentioned quarter by a handsome bridge. The manufactures of D. are sail-cloth, rope, carriages, tobacco, and earthen-ware, and its chief exports are timber, wood pulp, paper, iron, and pitch. It has a numerous merchant marine. Pop. '91, 20,687.

DRANESVILLE, a district in Fairfax co., Va., about 18 miles w. of Washington. A battle was fought here, Dec. 20, 1861, between the unionists and the confederates. It was an artillery duel, important only as the first success gained by the union army of the Potomac. Pop. '90, 2994.

DRAPER, ANDREW SLOAN, was born at Westford, N. Y., June 21, 1848; admitted to the bar, 1871; was one of the judges in the court of Alabama claims, 1884; president of the University of Illinois, 1894; has published *The Origin and Development of the N. Y. Common School System*, 1889, etc.

DRAPER, HENRY, M.D., 1837-82; b. Va.; son of John William; d. New York. He studied at New York univ., 1852-54; began medical practice, 1858; was on the Bellevue hospital staff, 16 months; prof. of physiology in the univ., 1860; prof. in the medical school, 1866-73; afterwards taught analytical chemistry in the univ. Dr. D. made important discoveries in photo-chemistry; published *Text-Book of Chemistry*, 1864, and many articles on photography, spectroscopy, etc. His diligent investigations greatly advanced the departments of science to which his labor was directed.

DRAPER, JOHN CHRISTOPHER, M.D., was born in Virginia in 1835. He entered the university of New York in 1852. Though he subsequently ceased the study of the classics, he attended the course in medicine, graduating in 1857. From March, 1856, for a period of sixteen months he held the position of house physician and surgeon at Bellevue hospital. In 1856 he published papers on *The Production of Urea*, and *Experiments on Respiration*. In 1857-58 he travelled and studied in Europe. From 1858-61 he occupied the chair of analytical chemistry in the university of New York. During a portion of this period (1860-63) he was professor of chemistry at Cooper Union, and for three months of the year 1862 served in the field as assistant-surgeon to the Twelfth regiment of New York. In 1863 he became professor of the natural sciences at the college of the City of New York, and in 1866 a professorship in the medical department of the university of New York was conferred upon him, both of which positions he held till his death, in 1885. In 1873 Trinity college bestowed upon him the degree of LL.D. He was a member of the New York academy of medicine, contributed many articles to medical and scientific journals; was editor in 1872-73 of the *Year-Book of Nature and Science*, and for three years had charge of the department of natural sciences in *Scribner's Monthly*. His other important works were a *Text-Book on Anatomy, Physiology and Hygiene* (1866); *A Practical Laboratory Course in Medical Chemistry* (1882); and a *Text-Book of Medical Physics* (1885). He died 1885.

DRAPER, JOHN WILLIAM, American chemist and physiologist, was b. near Liverpool, England, May 5, 1811, and educated at a Wesleyan school at Woodhouse Grove, and later pursued his studies in chemistry under Dr. Turner of the London university. In 1833, he joined some of his relations who had emigrated to America, and in 1836, took his degree of doctor of medicine in the university of Pennsylvania, and was appointed professor of natural philosophy, chemistry, and physiology in Hampden Sidney college, Virginia. In 1839, removing to the city of New York, he was connected with the preparatory department, and in 1841, joined Drs. Mott, Patterson, etc., in founding the medical college of New York university, in which he was at first professor of chemistry, and in 1850, of physiology. D. was a clear and able lecturer, and a voluminous writer, having been a liberal contributor to the *American Journal of Medical Science* and the *Edinburgh Philosophical Journal*, and published a treatise on *The Forces which produce Organization in Plants* (4to, 1844); *Text-book of Chemistry* (12mo, 1846); *Text-book of Natural Philosophy* (8vo, 1847); *Human Physiology, Statical and Dynamical, or the Conditions and Course of Life in Man*. Dr. Draper also published *History of the Intellectual Development of Europe*; *Thoughts on the Future Policy of America* (1865); *Philosophical History of the Civil War in America* (1867-70); *History of the Conflict between Religion and Science* (1874). He d. 1882.

DRAPIER LETTERS were written by Dean Swift over the signature "M. B. Drapier," in which he counseled the people of Ireland not to receive the money coined by William Wood, to whom the English government had granted a patent in 1722 to supply a deficiency in the coinage of that country of more than £100,000. The letters made a great sensation in Ireland, and caused the patent to be canceled, but not until about £80,000 in half-pence had been coined. Popular feeling was so intense at the time that Wood was forced to leave the country. See **SWIFT, JONATHAN.**

DRAUGHT, or DRAFT, OF WATER, is a technical name for the depth to which a ship sinks in the water when fairly afloat. When a ship is in good trim the D. does not

differ much at the two ends. For D. as applied to plows, wagons, etc., see CART; Plow; STEAM-CARRIAGE; WAGON.

DRAUGHTS, like chess, is a game played with "men" on a checkered board. As far as the science of the game is concerned, it falls far short of chess, but is nevertheless a favorite recreation with many classes of people. In France it is called *les dames*, from its having been a favorite game with ladies; and in Scotland the draught-board is called the *dambrod*.

Two persons usually play this game, each having a set of twelve men—one set black, the other white. The men may be placed either on the black or white squares, but the whole must be placed on one color only. Thus, in England, it is usual to play upon the white squares, with a black square to the lower right, and in Scotland upon the black, with a white square to the lower right. In chess, the men may be moved straight forward, sidewise, or diagonally, and over many squares at once; but in D., the men may be moved diagonally only, and by one square at a time. If an enemy's man stands in the way, no move may take place unless there be a vacant square beyond into which the piece can be lifted. The man leaped over is then taken and removed from the board. The grand object of the game is, therefore, to clear the board of the enemy's men, or to hem them in so that they cannot be moved, and whichever party does so first, wins the game. As no piece can move more than one step diagonally at a time, there can be no taking till the antagonists come to close quarters; and the advancing of them cautiously into each other's neighborhood is the chief art of the game. When a man on either side has made his way, either by taking or by a clear open path, to the opposite side of the board, he is entitled to be "crowned," which is done by placing another man on the top of him. Crowned men may move either backwards or forwards, but always diagonally and by one square at a time, as before; and this additional power thus gained gives a great advantage to the player who owns the greatest number of crowned heads, and usually decides the game in his favor.

DRAVE (Ger. *Drau*), a river of Austria, rises in the e. of Tyrol, in lat. 46° 45' n., and long. 12° 25' e., flows n.e. through the Pusterthal towards Lienz, where it is joined by the Isel. It then flows e. through Carinthia, passes Villach, where it becomes navigable, after which it passes Marburg, receives the Dran from the right, and the Mur, its principal affluent, from the left; then turning towards the s.e., it forms the boundary between Croatia and Slavonia on the right, and Hungary on the left, and pours its waters into those of the Danube at a point 10 m. e. of Essek, the capital of Slavonia. The D. is nearly 465 m. long. In the first part of its course, it is a mountain torrent, rushing furiously through the mountain passes of Tyrol; but joined by numerous streams, its volume increases, and its course becomes more staid. The valleys through which it flows in its course through Carinthia, Styria, and Croatia, are distinguished by great fertility and picturesque scenery, while the population upon its banks is numerous and industrious. In Slavonia, the D. is frequently bordered by dense forests.

DRAVIDIANS is a name given to a large group of the non-Aryan races of southern India, including those speaking Tamil, Telugu, Canarese, Malayalam, Toda, Goud, and six other tongues of minor importance—in all nearly 50,000,000 of people. These languages are all distinguished by having a rational and irrational gender of nouns, which in the verbs also are indicated by pronominal suffixes. Thus, "they did it" is different in Tamil according as the nominative is rational or irrational. Another characteristic of the Dravidian languages is the absence of the passive voice. Rask did much to establish the Dravidian group; the second edition of Bishop Caldwell's great work, *Comparative Grammar of the Dravidian Languages* (1875; the 1st ed. having appeared in 1856), is the standard authority. See INDIA.

DRAWBACK, a term in commerce, employed in connection with the paying back or remitting of duties, whether excise or import, on certain classes of articles. In this country the chief application of the principle of drawback is to imported articles, or those manufactured in part or wholly of imported materials, on which duties have been paid, when such articles are designed for exportation, a drawback being allowed in these cases to the amount of the duties advanced. These duties, of course, enhance by so much the natural price of the commodities on which they are imposed, and were they not remitted, the articles so taxed would not be salable in those foreign countries where articles of the same kind could be purchased free of such duties. Adam Smith, in his *Wealth of Nations*, discussing the propriety of giving drawbacks on excise duties, remarks that, "Such encouragements do not tend to turn towards any particular employment a greater share of the capital of the country than what would go to that employment of its own accord (had no duty been imposed), but only to hinder the duty from driving away any part of that share to other employments. They tend not to overturn that balance which naturally establishes itself among all the various employments of society, but to hinder it being overturned by the duty; they tend not to destroy, but to preserve what it is in most cases advantageous to preserve, the natural division and distribution of labor in society."

Regulations affecting drawback in the United States are to be found in the Revised Statutes. Besides the remission of duties on imported articles to be exported for sale abroad, a drawback is allowed on firearms, agricultural implements, etc., made of

foreign materials with stocks and handles of wood grown in this country, provided the imported materials exceed one-half of the value of the whole material used. Every one entering merchandise for importation or exportation with right of drawback is required to deposit the original invoice of such merchandise with the collector, who causes an inspection to be made by the proper officer and the articles to be compared with their respective invoices before granting the permit for lading. No drawback is allowed on merchandise entitled to debenture under existing laws unless it be exported within three years from the date of importation.

DRAWBRIDGE. See **BRIDGE.**

DRAWER OF A BILL. See **DRAFT, BILL.**

DRAWING is the art of delineating form, as opposed to color and light and shade. The term is not confined to the first outline produced by the pencil or crayon, though this is a narrower sense in which it is also used, and what we commonly mean when we speak of a drawing. In its wider sense, D. is used to describe what is in reality the most important feature of a finished painting of Raphael or Correggio, as well as of an outline by Flaxman or Retzsch. D., in this sense, has been termed the grammar of art. But the analogy is incomplete; for the one quality which is requisite in the application of grammar, is correctness, whereas D., even when correct, even when faultless, admits of degrees of perfection. It may be more or less powerful, more or less free, more or less graceful; and indeed there is no characteristic in which the great artists of the Italian and Flemish schools more unmistakably excell all their successors, than in the power and beauty of their drawing. Neither is there any feature which more unmistakably stamps the individuality of the artist upon the picture.

DRAWING-BOARD, a board on which drawing-paper is strained for painting on in water-colors. The paper is wetted for the purpose of being strained, and, when attached at the edges, it is permitted to dry and contract. Formerly, the drawing board was fitted into a frame, the edges of the wet paper being made fast by the pressure of the frame on the board. But the much simpler drawing-board which is now in use is made of a flat piece or pieces of wood, held together, and prevented from warping, by an edging of other pieces, the grain of which runs in the opposite direction. The wet paper is attached to the edges of the board with paste or thin glue, and when dry, becomes perfectly firm and flat.

DRAWING AND QUARTERING. The English punishment for treason requires that the offender be *drawn* to the place of execution on a hurdle (q.v.); that he be hanged by the neck till he be dead; that his head be severed from his body, and that body be divided into four parts, or *quartered*. The sovereign may, and now certainly would, by a warrant under the sign-manual, countersigned by a principal secretary of state, change the sentence into beheading. In the case of females, the quartering is dispensed with. Stephen's *Commentaries*, iv. 234. See **TREASON.**

DRAWING-ROOM (abbreviated from *withdrawing-room*), the name of an apartment to which persons repair on leaving the dinner-table; hence any room in which company is received. In this sense, the word is in general use in Great Britain, but in the United States "parlor" is usually applied to such an apartment, irrespective of its size. The drawing-room of a sovereign is an assembly at which both ladies and gentlemen appear, in distinction from a levee, to which gentlemen only are admitted. See **LEVEE.**

DRAW-PLATE, a steel plate with a graduated series of holes, through which metals are drawn in making them into wires or bars.

DRAYTON, MICHAEL, was b. in 1563 at Hartshill, in Warwickshire. Of the events of his life but little is known. He is supposed to have studied at the university of Cambridge, and to have been in the army when young. His earliest work, *The Shepherd's Garland*, was published in 1593. He afterwards published the *Barons' Wars; England's Heroical Epistles*, etc. The *Polybion*, the work by which he is best known, appeared in 1613. He was poet-laureate in 1626; he died in 1631, and was buried in Westminster abbey. As a poet, D. is but little known, save to readers like Charles Lamb, who delighted in the obscure corners of literature. His *Polybion* is a topographical poem; and passages from it, now and then met with in county histories and works of an antiquarian character, surprise the readers with their stately rhythm, their nervous force, and their felicity of diction. Vols. I., II., and III. of a complete edition of D.'s works, by the Rev. Richard Hooper, M.A., were published in 1876.

DRAYTON, WILLIAM HENRY, 1742-79; b. S. C.; educated at Oxford, England. In 1771, he was privy councilor of South Carolina; but when the revolution began, he espoused the popular cause, and became a member of the committee of safety. In 1775, he was president of the provincial congress, and the next year was elected chief-justice of South Carolina. He was a prominent member of the continental congress until his death. He left a minute narrative of the current events of the revolution.

DREAMING. In complete sleep, there is probably an entire absence of consciousness of external things. Usually, however, there is a certain amount of mental activity, of which we are more or less conscious at the time, and of which we have more or less subsequent remembrance. This is the state known as dreaming. The chief feature of

this state is "an entire *absence of voluntary control* over the current of thought, so that the principle of *suggestion*—one thought calling up another, according to the laws of association—has unlimited operation."⁵ We seem to perform all the actions of life; we experience every kind of mental emotion, and sometimes our reasoning processes are remarkably clear and complete. Thus, when the mind, during sleep, takes up a train of thought on which it had been previously engaged during the preceding waking hours, intellectual efforts may be made during sleep which would be impossible in the waking state. Such cases, however, are not common. To name two instances (quoted by Dr. Carpenter in his essay on sleep in the *Cyclopædia of Anatomy and Physiology*): Condorcet saw, in his dreams, the final steps of a difficult calculation which had puzzled him during the day; and Condillac states that, when engaged with his *Cours d'Etude*, he frequently developed and finished a subject in his dreams which he had broken off before retiring to rest.

Occasionally, but by no means commonly, dreams seem to possess a remarkable coherence and congruity in reference to the reasoning processes, or the combinations of the imagination. Most of our readers are probably acquainted with the incident narrated by Coleridge of himself, that his fragment entitled *Kubla Khan* was composed during sleep, which had come upon him in his chair whilst reading the following words in Purchas' *Pilgrims*: "Here the khan Kubla commanded a palace to be built, and a stately garden thereunto; and thus ten miles of fertile ground were inclosed within a wall." Coleridge continued for about three hours apparently in a profound sleep, during which he had the most vivid impression that he had composed between 200 and 300 lines. The images, he says, "rose up before him as things, with a parallel production of the correspondent expressions, without any sensations or consciousness of effort." On awakening, he had so distinct a remembrance of the whole, that he seized his pen and wrote down the lines that are still preserved. Unfortunately, he was called away to attend to some business that lasted more than an hour, and on his return to his study, he found, to his intense mortification, that "though he still retained some vague and dim recollection of the general purport of the vision, yet, with the exception of some eight or ten scattered lines and images, all the rest had passed away like the images on the surface of a stream into which a stone had been cast." In other cases, a dream may leave a strong general impression on the mind, although particulars, even immediately on waking, cannot be recalled. Tartini is said to have composed the *Devil's Sonata* under the inspiration of a dream, in which the arch-fiend challenged him to a trial of skill. The dreamer lay entranced by the transcendent performance of his distinguished visitor; but on awakening and seizing his violin, although he was unable to reproduce the actual succession of notes, he produced from his general impressions the celebrated composition which we have named.

Generally, however, dreams are wanting in coherence; all probabilities, and even possibilities of "time, place, and circumstance" are violated. Friends long since dead appear and converse with us; and events long since past rise up before us with all the vividness of real existence. We may be conveyed to the antipodes, or even to worlds beyond our own, without the difficulty of the distance at all standing in the way. We are not aware of the grossest incongruities, probably because we are unable to test the probability of the phenomena by our ordinary experience; hence nothing that we see or do in a dream surprises us. Prof. Wheatstone observes, that "we may walk along the brink of a precipice, or see ourselves doomed to immediate destruction by the weapon of a foe, or the fury of a tempestuous sea, and yet not feel the slightest emotion of fear; though during the perfect activity of the brain we may be naturally disposed to the strong manifestation of this feeling. Again, we may see the most extraordinary object or event without surprise, perform the most ruthless crime without compunction, and see what in our waking-hours would cause us unmitigated grief, without the smallest feeling of sorrow;" and Cicero, who long previously had made D. his study, justly remarks (*De Divinatione*, 59), that if it had been so ordered by nature that we should actually do in sleep all that we dream, every man would have to be bound down on going to bed. Occasionally, however in place of this passive condition, the emotions may be highly excited; thus, for example, the sailor's wife is apt, especially in stormy weather, to dream of shipwreck, and to shriek with terror from its attendant miseries; and those who have once in their lives been exposed to some fearful danger, are apt to have the scene recalled to them in their dreams, either with all its appalling and life-like exactness, or possibly in a grotesque and impossible modification.

Although the predisposing causes of dreams may be sought for in more than one direction, they are probably in general referable to some peculiar condition of the body, and are often called into action through the agency of the external senses. Dr. Gregory relates, that having occasion to apply a bottle of hot water to his feet at bed-time, he dreamed that he was walking up Mt. Etna, and found the ground insufferably hot. Dr. Reid having had a blister applied to his head, dreamed that he was scalped by a party of Indians. M. Gizon de Buzereinges made a series of pre-arranged experiments, with the view of seeing how far he could determine at pleasure the character of his dreams. In his first experiment, having allowed the back of his head to be uncovered during sleep, he thought that he was at a religious ceremony in the open air; the custom of the country in which he lived being to keep the head covered, except on some rare occur-

rences, among which was the performance of religious ceremonies. On waking, he felt cold at the back of the neck, as he frequently had felt when present at the real ceremonies. He repeated the experiment in two days with the same result. In a third experiment, he left his knees uncovered, and dreamed that he was traveling at night in the diligence; and all travelers know, he observes, that it is chiefly at the knees that they feel cold when traveling by that conveyance at night.

One of the most remarkable phenomena of D., is the rapidity with which long trains of thought pass through the mind. A dream requiring hours for its accomplishment, is begun and terminated in a few seconds. A person who was suddenly aroused from sleep by a few drops of water sprinkled in his face, dreamed of the events of an entire life in which happiness and sorrow were mingled, and which finally terminated with an altercation upon the borders of an extensive lake, in which his exasperated companion, after a considerable struggle, succeeded in plunging him. Dr. Abercrombie relates a similar case of a gentleman, who dreamed that he had enlisted as a soldier, joined his regiment, deserted, was apprehended, carried back, tried, condemned to be shot, and at last led out for execution. After all the usual preparations, a gun was fired; he awoke with the report, and found that a noise in an adjoining room had both produced the dream and aroused him from sleep. Dr. Carpenter mentions the case of a clergyman falling asleep in his pulpit during the singing of the psalm before the sermon, and awakening with the conviction that he must have slept for at least an hour, and that the congregation must have been waiting for him; but on referring to his psalm-book, he was consoled by finding that his slumber had lasted not longer than during the singing of a single line. Sir Benjamin Brodie, in his *Psychological Inquiries* (1854), mentions the following anecdote of the late lord Holland: "On an occasion when he was much fatigued, while listening to a friend who was reading aloud, he fell asleep and had a dream, the particulars of which it would have occupied him a quarter of an hour or longer to express in writing. After he woke, he found that he remembered the beginning of one sentence, while he actually heard the latter part of the sentence immediately following it, so that probably the whole time during which he had slept, did not occupy more than a few seconds." Many facts of the same kind are on record, and as the author from whom we have quoted, remarks, "were we to pursue this subject, it would lead us to some curious speculations as to our estimate of time, and the difference between the real and the apparent duration of life." It is from cases of this nature that lord Brougham has been led to the opinion, that *all* our dreams really take place in the act of falling asleep or of awaking. We cannot, however, explicitly accept this doctrine. 1. There is no sufficient proof of its being true. 2. We have a proof to the contrary in the fact, that it is common for people to moan and even talk in the middle of a sleep; and every one who has kept a dog must frequently have observed him dreaming (from the outward manifestations which he makes in the form of snarling or growling), though he still remains asleep. Some, on the other hand, have argued that the mind can never be entirely inactive, and that every one is dreaming throughout the whole period of sleep, although the dreams may not be remembered in the waking state. We know of no facts that can be adduced in favor of this hypothesis, and the following case goes strongly to disprove it: A woman, aged 26, who had lost a portion of the scalp, skull, and dura mater, so that a portion of her brain was exposed to view, was a patient in 1821 in the hospital at Montpeller. When she was in a dreamless state, or in profound sleep, her brain was comparatively motionless, and lay completely within its bony case; but when the sleep was imperfect, and the mind was agitated by dreams, her brain moved and protruded from the skull, forming what is termed cerebral hernia. This protrusion was greatest when the dreams, as she reported, were most vivid; and when she was perfectly awake, especially if actively engaged in conversation, it attained its highest development, nor did this protrusion occur in jerks, alternating with recessions, as if caused by arterial action, but remained permanent while the conversation continued. If the *data* of this case are to be depended on, the appearance of the brain during profound sleep seems to indicate that during that state there is a total or nearly total suspension of the mental faculties.

The author of *Psychological Inquiries* suggests the question: Do dreams answer any purpose in the economy of living beings? We regret that he has not given us a very definite answer, but he obviously inclines to the view that they cannot be purposeless. No one has hitherto offered any certain explanation of the uses of the spleen, of the thyroid gland, or of the supra-renal capsules; yet no one believes the formation of these organs to be merely incidental, or doubts that they have some special (although at present unknown) function to perform. "Dreams are," he observes, "at any rate, an exercise of the imagination. We may well conceive that one effect of them may be to increase the activity of that faculty during our waking-hours, and it would be presumptuous to deny that they may not answer some purpose beyond this in the economy of percipient and thinking beings."

Dreams have, in all ages and countries, been believed in as indications of the future; and of all forms of superstition, this is perhaps the most excusable. Whatever is mysterious as to its cause, and beyond the power of the will, appears as supernatural; and what more so than dreams! The thoughts in dreams, too, arise out of the past and present circumstances of the dreamer, and therefore are not altogether without connec-

tion with his future destiny, as most other omens are. In the Homeric age, it was firmly held that "dreams come from Zeus." In the most ancient civilized communities of which we have any record—those of Egypt and Babylon—to interpret the monarch's dreams was one of the most important state offices, and was confided to a college of wise men. A common way of consulting the Greek and Roman oracles (q. v.), was for the inquirer to sleep a night in the temple, after performing sacrificial and other rites, when his questions were supposed to be answered in dreams. Grave philosophers wrote treatises on the interpretation of dreams, as they did on astrology. Even Bacon, although he confesses that the interpretation of dreams is mixed with numerous extravagances, yet speaks as if he thought that something might be made of it. In modern times, and among European nations, dreams are seldom heeded except by the very ignorant or superstitious; and "as idle as a dream" has become a proverb. Nothing can be conceived more arbitrary than the pretended rules of interpretation—e. g., "that to dream of gold is good luck, but of silver, ill." See Brand's *Popular Antiquities*, by Ellis, where a "Dictionary of Dreams" is given. As to the actual coincidences that sometimes happen between dreams and events, it is only surprising, considering the countless fancies that are passing through our minds while asleep, that the coincidences are not ten times more numerous than they are.

DREBBEL, CORNELIS VAN, 1572-1634; a Dutch inventor of whose life little is known. He seems to have been a favorite at court, and tutor to the son of Ferdinand II. In the thirty years' war he was arrested and saved from execution only through interference of James I. of England. After 1620, he resided in London, where, it is said, he invented the compound microscope and an air thermometer with its bulb filled with water. It was reported also that he showed the king a glass globe in which, by means of the four elements, he had produced perpetual motion; and that by means of other machinery he imitated lightning, thunder, rain, and cold, and was able to speedily exhaust a river or lake. He made some discoveries in dyes, which were used by the founders of the Gobelins manufactures.

DREDGE, a machine for dragging or dredging the bottom of seas, rivers, or lakes, in order to bring up oysters and other animals that lie on the bottom. The common oyster-dredge is a bag-net, made of iron rings, linked together to form the meshes; the mouth is made of sheet-iron, which acts as a scoop when the dredge is let down and drawn along the bottom as the boat sails on. The dredge has of late been very extensively used by the naturalist with very important results, among the most remarkable of which are those obtained by the *Challenger* expedition, showing the existence of animal life in great variety at depths where it had before been considered impossible. The ordinary naturalist's dredge is of a lighter construction than that of the oyster-fisher, and its meshes should be smaller. For dredging a sandy bottom, the best form of dredge is one like the net used by the Kentish shrimpers. These are twine nets, bag-shaped, and of the length of the boat. The lower side of the mouth of the net is stretched upon a wooden pole, and the other side is held up while the lower is drawn along the bottom. The quantity and variety of animals drawn up by these nets are astonishing. The dredge used for soles resembles the shrimp-net; but all dredges must be modified to suit the bottom on which they are used.

Naturalists generally employ an instrument constructed on the general plan of an oyster-dredge for obtaining specimens of animals living at the bottom of the sea, to determine their structure and geographical distribution. In working, the dredge is slipped gently over the side of the boat, either from the bow or the stern. When it reaches the bottom and begins to scrape, an experienced hand upon the rope can usually detect by the tremor of the line when the dredge is passing over an irregular surface. The boat should move not more than a mile in an hour. The dredge may remain down from 15 to 20 minutes, within which time, in favorable circumstances, it may be fairly filled. It comes up variously freighted, according to the locality, and the contents are examined. The scientific value of dredging depends mainly upon two things: the care with which objects procured are preserved and labeled for future identification, and the accuracy with which all the circumstances of the dredging—the position, the depth, the nature of the ground, the date, temperature, etc.—are recorded.

Until the middle of the 18th c. the little that was known of the inhabitants of the sea beyond low-water mark seems to have been gathered almost entirely from objects thrown on the beach after storms, and from the chance captures of fishermen. The dredge was used to aid natural history, first by Otto Frederick Müller, in the researches which furnished material for his *Descriptions and History of the rarer and less known Animals of Denmark and Norway*, 1779. Thenceforward much advance was made in knowledge of deep-sea life, mainly by the efforts of the British association; but the first important undertaking was in the winter of 1872. At that time *The Challenger*, a steam-corvette of 2,306 tons, and 1234 horse-power, was sent out to investigate the physical and biological conditions of the great ocean basins. This vessel was thoroughly equipped, and carried a corps of distinguished scientists. Dredging was done from the main yard-arm. A strong pendant was attached by a hook to the cap of the main-mast, and, by a tackle to the yard-arm, a compound arrangement of 55 to 70 of Hodge's patent accumulators was hung to the pendant, and beneath it a block through

which the dredging-rope passed. The donkey-engines for hauling in the dredging and sounding gear were placed at the foot of the main-mast on the port side. They consisted of a pair of direct-acting high-pressure horizontal engines, in combination of 18-horse power nominal. Instead of a connecting rod to each, a guide was fixed to the end of the piston-rod, with a brass block working up and down the slot of the guide. The crank axles ran through the center of the blocks, and the movable block, obtaining a backward and forward motion from the piston-rod, acting on the crank as a connecting rod would do. This style of engine is commonly used for pumping, the pump-rods being attached to the guide on the opposite side from the piston-rod. At one end of the crank a small-toothed wheel was attached, which drove one thrice the multiple on a horizontal shaft extending nearly across the deck, and about 3 ft. and 6 in. above it. At each end of this shaft a large and small drum were fixed, the larger having three sheaves cast upon it of different sizes; the small being a common barrel only. To these drums the line was led, two or three turns being taken round the drum selected. In hauling in, the dredging-rope was taken to a gin-block secured to a spar on the fore-castle, then aft to the drum of the donkey-engine on the port side, then to a leading-block on the port side of the quarter-deck, and across the deck to a leading-block on the starboard side corresponding in diameter with the drum used on the port side, and from this it was finally taken by the hands and coiled. The strain is of course greatest at the yard-arm and the first leading-block, and by this arrangement it is gradually diminished as the line passes round the series of blocks and sheaves. A change made latterly in the handling of the dredge had certain advantages. Instead of attaching the weights directly to the dredge-rope, and sending them down with the dredge, a "toggle," a small spindle-shaped piece of hard wood, was attached transversely to a rope at the required distance, 200 to 300 fathoms in advance of the dredge. A "messenger," consisting of a figure of eight of rope, with two large thimbles in the loops, had one of its thimbles slipped over the chain before the dredge was hung, and the other thimble made fast to a lizard. When the dredge was well down and had taken its direction from the drift of the ship, the weights, usually six 28-lb. deep-sea leads in three canvas covers, were attached to the other thimble of the traveler, which was then cut adrift from the lizard and allowed to spin down the line until it was brought up by the toggle. By this plan the dredge took a somewhat longer time to go down; but after it was adopted not a single case occurred of the fouling of the dredge in the dredge-rope, a misadventure which had occurred more than once before, and which was attributed to the weights getting ahead of the dredge in going down, and pulling it down upon them entangled in the double part of the line.

The great risk in dredging in very deep water is that of the dredge running down nearly vertically and sinking at once into the soft mud, and remaining imbedded until hauling in commences. During the earlier part of the voyage of the *Challenger* this accident frequently defeated, at least partially, the object of the operation; and, after various suggestions for modifying the dredge, it was proposed to try some form of the trawl in order to insure, so far as possible, the capture of any of the larger marine animals which might be present, and thus to gain a better general idea of the nature of the fauna. A 15-ft. beam-trawl was sent down off cape St. Vincent to a depth of 600 fathoms; the experiment looked hazardous, but the trawl duly came up, and contained, with many of the larger invertebrata, several fishes. The trawl seemed to answer so well that it was tried again a little further s. in 1090 fathoms, and again it was perfectly successful; and during the remainder of the voyage it was employed almost as frequently, and in nearly as deep water (3,125 fathoms in the Pacific), as Ball's dredge was in the Atlantic, where the deepest haul was at 3,150 fathoms. During the voyage of the *Challenger*, a course of about 70,000 nautical miles was traversed in three years and a half, and 362 observing stations were established at intervals as nearly uniform as circumstances would permit; and at the greater number of these, dredging or some modification of the process was successfully performed—52 times at a depth greater than 2,000 fathoms, and thrice at depths beyond 3,000 fathoms. So fully convinced were the *Challenger* officers that they could dredge at any depth, that it was only want of time and daylight which prevented their doing so at their deepest sounding, 4,575 fathoms. The Atlantic was crossed five times, and an erratic route through the Pacific gave a good idea of the conditions of the abysses of that ocean, while in the s. Indian ocean dredging and trawling were carried down close to the Antarctic ice-barrier.

The results of this expedition were of the most interesting nature. Animal life was found to exist at all depths, although probably in diminishing abundance as the depth becomes extreme; and in various parts of the world at depths beyond 400 or 500 fathoms the fauna had much the same general character. The species usually differed in widely separated areas, but the great majority of forms, if not identical, were so nearly allied that they might be regarded as representative and genetically related. Although all marine invertebrate classes were represented, echinoderms in their different orders, sponges and crustacea preponderated, while corals and mollusca were comparatively scarce. In the two groups first named, many forms occurred allied to families which had been previously regarded as extinct or nearly so; thus among the echinoderms, stalked crinoids were by no means rare, and many species of regular *echinidea* related to the chalk genus *echinothuria*, and many irregular species allied to *ananchytes* and *dysaster*,

occurred. The sponges were mainly represented by the *hexactinellida*, the beautiful order to which the glass-rope sponge of Japan and the marvelous "Venus's flower-basket" of the Philippines belong, the order to which the ventriculites of the chalk must also be referred. See SOUNDING, DEEP SEA.

Dredging at its greatest depth is a difficult and critical operation, and although by its means some idea of the nature and distribution of the abyssal fauna of the ocean has already been attained, it will be long before the blanks are filled up; for of the area of 140,000,000 sq.m. forming the "abyssal province," the actual amount hitherto traversed by the naturalist's dredge may still be readily reckoned by the square yard. See *illus.*, DIVING APPARATUS, vol. V., 1; WATER STORAGE, vol. XV.

DREDGING-MACHINE, a machine used for clearing out or deepening the channels of rivers, harbors, etc. Dredging-machines are variously constructed, the simplest being like the oyster-dredge described above, only having a perforated cowhide bag instead of the chain-net, and a stronger "spoon" or iron mouth to the bag. This is attached to the end of a pole, and worked with tackle by men from a barge in such a manner that the loose matter of the bottom is scooped up into the barge. The bucket dredging-machine is much more efficient. It consists of a long stage or framework overhanging the side of the barge. This frame has a wheel at each end, upon which works a powerful endless chain, to which is attached a series of perforated iron buckets, each with a shovel-shaped steel mouth projecting considerably on one side. The overhanging framework forms an inclined plane, along which the buckets run, descending on one side, and ascending on the other. They are so arranged that they descend empty, and on reaching the bottom, the projecting shovel or scoop-mouth digs into the bottom, and partially fills the bucket with the silt; it then turns round on the wheel at the lower end of the incline, and runs up it till near the top, when it turns over the upper end, and in doing so its contents are emptied into a second attendant barge. This action is continued by every succeeding bucket of the endless chain. The perforations are for the passage of the water. By varying the inclination of the framework, the working depth may be increased or diminished. Some dredgers are fitted with two complete sets of buckets, one on each side of the vessel. A steam-engine and boiler, suitably placed in the dredger, are provided for giving motion to the machinery, and sometimes also to a screw-propeller placed at the stern.

DRED SCOTT CASE. One of the most famous cases ever passed upon by the Supreme Court of the United States. Dred Scott was a Missouri slave whose master in 1834 took him to Illinois, a state which prohibited slavery by statute. In Illinois, Dred Scott married and remained by his master's consent until 1838, when he was taken to Minnesota, a territory in which slavery was expressly prohibited by the act of Congress (1820), commonly known as the Missouri Compromise (q.v.). From Minnesota, his owner took him back to Missouri, and there for some offense whipped him. Dred Scott brought suit against his master for damages, claiming that, by reason of his residence in Illinois and Minnesota, he had become a free man. The master, on the other hand, denied that Dred Scott could sue, inasmuch as he was descended from slave ancestors and had himself never been set free. The case was decided in favor of Dred Scott by the Circuit Court of the State of Missouri, and was appealed by the master to the Supreme Court of the United States.

The decision of this tribunal was rendered in 1857. It declared that the ancestors of negro slaves were not regarded by the founders of the government as persons at all, but as chattels, mere things "who had no rights and privileges but such as those who held the power and the government might choose to grant them;" that Dred Scott was necessarily, therefore, not a citizen but a *thing*, and hence could have no standing in the court; and finally that his residence in Minnesota could not confer freedom upon him, because the act of Congress of 1820 was unconstitutional and void. The court then went on to say that Congress had no more right to prohibit the carrying of slaves into any state or territory than it had to prohibit the carrying thither of horses or any other property, for slaves were property whose secure possession was guaranteed by the Constitution. This was the decision of the majority of the court, consisting of Justices Taney (the chief-justice), Grier, Nelson, Catron, Daniel, Campbell, and Wayne; Justices McLean and Curtis dissenting.

DREIBUND. See TRIPLE ALLIANCE.

DREIS'ENA, a genus of lamellibranchiate mollusks, generally regarded as belonging to the mussel family (*mytilide*), although, whilst the shell very much resembles that of the true mussels, the animal differs in having the mantle closed except at the anal and branchial slits, and a small aperture through which the foot and byssus protrude.—*D. polymorpha* is an interesting mollusk, because, having of late been accidentally introduced into British estuaries and canals, it has fully established itself, and is now abundant in many of them, and in the rivers with which they are connected. Originally, it is believed, a native of the rivers which flow into the Caspian sea and lake Aral, it has extended to the canals and rivers of Germany, Holland, etc. It is capable of living a long time out of water with its valves closed, and it is supposed that it may have come to Britain on timber imported from the continent.

DRELICOURT, CHARLES, 1595-1669; a French Calvinistic minister at Langres, 1618. In 1620, he went to Paris, and was made minister of the church at Charenton. He wrote a large number of devotional works, which had a wide circulation. His

Catechism, and *Consolations against the Fear of Death*, became well known in England. His controversial works were also numerous, and did much to consolidate the Protestant party of France. A number of his sons were distinguished as theologians or physicians.

DRENTHE, a frontier province of the Netherlands, is bounded on the e. by Hanover, on the n. and e. by Groningen, on the w. by Friesland, and on the w. and s. by Overijssel, in lat. $52^{\circ} 37'$ to $53^{\circ} 23'$ n., and long. $6^{\circ} 12'$ to $7^{\circ} 10'$ east. Area, 1030 sq. miles. Pop. '95, 141,225. The soil is in general poor, only about one half of the surface being capable of cultivation, the remaining portion covered chiefly with heath and morass. The principal crops are rye and buckwheat, but barley and oats are also raised. The inhabitants are chiefly employed in agriculture, pasturage—the cattle reared in D. being famous—and in digging and exporting peat. Two pauper colonies in the w. of the province, the Fredericksoord and Willemsoord, established in 1818, are employed by the state in bringing waste land under cultivation, and in brick-making, weaving, and other occupations.

DRESDEN, the capital of the kingdom of Saxony, situated in a charming valley on both sides of the Elbe, in lat. $51^{\circ} 3' 16''$ n., and long. $13^{\circ} 44'$ east. It is 116 m. e. of Berlin, and 72 m. e.s.e. of Leipsic. It is composed of the Altstadt (Old Town), on the left bank of the Elbe; and of the Neustadt (New Town), on the right or northern bank. D. is a pleasant, though not exactly a beautiful town. It contains several open squares both in Old and the New towns. Pop. '95, 334,066. On account of its architecture and splendid collections in art, it has been justly called the "German Florence." Of the churches, the finest are the Frauenkirche, with a tower 335 ft. in height; the Roman Catholic church (1737-56), with a celebrated organ by Silbermann, and numerous statues and pictures; the Sophienkirche; and the Kreuzkirche, with an altar-piece by Schönau. The synagogue of the Jews, built in the oriental style by Semper, is also worthy of mention. Among the other important buildings may be mentioned the royal palace, a shapeless edifice, begun by duke George, 1534, and completed by Augustus II.; the prince's palace, erected by Augustus II. in 1718; the Zwinger, only the vestibule of a palace in the almost too elaborate old French style of architecture, but containing many valuable antiquarian and scientific collections; the theater, the academy, the Brühl palace, etc. The Old and New towns are connected by two bridges, both *chefs-d'œuvre* of architecture.

D. possesses many excellent educational and charitable institutions. The academy of art opened in 1764, to which a school of architecture was added in 1819. This celebrated institution and the musical choir render D. of no small importance to the progress of art in the present day.

The most important branches of industry are gold and silver manufactures, machinery, straw-plait, paper-hangings, excellent painters' canvas, colors, artificial flowers, chocolate, porcelain, etc. An impulse was given to the corn-trade by the opening of the corn exchange in 1850.—The environs of D. are delightful.

The most important of the D. collections are: 1. The royal public library in the Japan palace, amounting to over 400,000 volumes. It contains many curiosities, and is particularly complete in the departments of literary history and classical antiquity, as well as in histories of France and Germany. 2. The cabinet of coins, likewise in the Japan palace. 3. The museum of natural history in the Zwinger, particularly complete in the mineralogical department. 4. The historical museum, formed in 1833. 5. The collection of mathematical and physical instruments, likewise in the Zwinger. 6. The renowned picture-gallery, containing upwards of 1500 paintings, mainly by Italian and Flemish masters. Among the former, those especially worthy of notice are the pictures of Raphael ("The Sistine Madonna"); of Correggio ("La Notte," and the "Madonna of St. Sebastian"); of Titian ("The Tribute-money," and "The Venus"); of Andrea del Sarto ("Abraham's Sacrifice"); of Francia; of Paul Veronese; of Giulio Romano ("The Virgin with the Pitcher"); of Leonardo da Vinci ("Francesco Sforza"); of Garofalo, Bellino, Pietro Perugino, Annibale Caracci, Guido Reni, Carlo Dolce, Cignani, etc. Of the Flemish school, the collection boasts 41 pictures by Rubens, 21 by Vandyck, many by Rembrandt, admirable specimens of Snijders, Johann Breughel, Ruysdael, Wouvermann, Gerard Dow, Teniers, etc. Of works of the German school, the gem of the collection is Hans Holbein's Madonna. Of the French school, several pictures by Nicolas Poussin, and some admirable landscapes by Claude Lorraine, are the most remarkable. 7. The cabinet of engravings in the Zwinger is arranged in twelve classes, marking distinct periods in the history of art. 8. The collection of antiques in the Japan palace, including several admirable sculptures. 9. The "green vault" in the royal palace, a valuable collection of precious stones, pearls, and articles wrought in gold, silver, and ivory. 10. The collection of porcelain in the Japan palace.

D. is known in history as far back as the year 1206. It is officially mentioned as a town in 1216. Henry the illustrious selected it for his capital in 1270. From the close of the 15th c., its prosperity gradually increased. Several successive sovereigns contributed to its embellishment, particularly Augustus I. and Augustus II. It suffered severely, however, during the seven years' war; and again in 1813, when Napoleon selected it as the central point of his operations. During the revolution of 1849, also, immense damage was inflicted upon the town, but it is again rapidly improving. D.

was occupied by the Prussians in 1866 during the Austro-Prussian war. Since that year the city has been enlarged and made more delightful. New streets have been opened; old irregular buildings have given way to handsome and imposing edifices. The foundation stone of the magnificent new Court Theatre was laid in 1871.

DRESDEN, BATTLE OF. In Aug., 1813, when the war between Napoleon and the allies, after a short truce, broke out afresh, the armies of the latter gathered from all sides towards Dresden, which they regarded as the key of the French position. It was held by St. Cyr with a force of about 30,000 men, the main body of the French under Napoleon being in Silesia, where the emperor expected the contest was to be waged. On the 23d, the grand army of the allies appeared before Dresden. The town would in all probability have been quickly stormed, had not Schwarzenberg and the Austrians insisted on waiting the arrival of the left wing under Klenau. This delay saved the French, for at half-past 9, on the morning of the 26th, Napoleon with his guards entered the town. At 4 o'clock in the afternoon, Schwarzenberg, the commander-in-chief of the allies, gave orders for the attack. At various points, the assault was irresistible, but the opportune arrival of the "young guard" enabled Napoleon to hazard a sally, which was as unexpected as it was successful. The allies fell back everywhere; but not dispirited, renewed the fight next day. Towards noon, Moreau was mortally wounded by a cannon-ball at Alexander's side on the height of Räcknitz, and Napoleon obtained a decided advantage over the left wing of the allied army, which Murat, by a skillful maneuver, contrived to outflank, taking 10,000 prisoners, among whom was Gen. Metsko. Several other successes in other parts of the field determined the allied armies, especially after hearing that Vandamme was advancing towards Pirne, to retreat, which they did during the night of the 27th Aug. Dresden, however, was not yet delivered from the miseries of war. When Napoleon finally quitted the city on the 7th Oct., nearly 30,000 men still remained behind. As all access was cut off by the Russians, the city suffered severely from famine. A capitulation was at length brought about (11th Nov., 1813) between St. Cyr and Klenau, according to which the garrison were to withdraw unmolested from the 12th to the 16th Nov., on condition that they laid down their arms. The capitulation was nevertheless rejected by prince Schwarzenberg, the garrison declared prisoners of war, and treated as such. The battle of Dresden, as Alison observes, was the *last* pitched battle, on a scale commensurate with his former victories, that Napoleon ever gained.

DRESS, the collective name for the artificial coverings worn in greater or less quantity by all but the most savage of the human race, and always combining the two objects of warmth and ornament. It seems, indeed, from what we read of savage nations, that it is rather in the desire for ornament that the wearing of dress begins, than with a view to protection from cold (see **FASHION**, under which head some notice will be given of the more singular caprices to which the forms of dress have been subjected; see also **CRINOLINE**, **BLOOMERISM**). The earliest coverings would consist of such articles as the skins of animals, and the leaves and inner bark of plants, which, as civilization advances, are mostly supplanted by various textures of wool, flax, silk, and other vegetable and animal substances. Some account of these textures is given under the appropriate heads, and the regulation of dress with a view to health is treated under **SANITARY SCIENCE**. As will be shown more fully under **FASHION**, the tendency in modes of dress—notwithstanding occasional aberrations—is towards simplicity and appropriateness.

DRESSINGS, in architecture, is a term loosely used to signify moldings and all the simpler kinds of sculptured decorations.

DREUX, an ancient t. of France, in the department of Eure-et-Loir, is situated on the river Blaise, 22 m. n.w. of Chartres, and 45 m. w. of Paris. It is tolerably well built, and lies at the foot of a hill crowned with the dilapidated ruins of an ancient castle, formerly the possession of the comtes de Dreux. From among the ruins rises a beautiful chapel, in the form of a Greek temple, surmounted by a cupola, erected by Louis Philippe. It contains the tombs of two of the children of Louis Philippe, and of others of his relations. The town-hall and the parish church, both handsome specimens of Gothic, are the only other buildings worthy of note. D. has extensive manufactures of coarse cloth, serge, etc., with a trade in sheep and cattle, also various tan-yards, iron-foundries, and dye-houses. Pop. of commune, '91, 9364. In 1562 one of the bloodiest battles recorded in the religious wars of France took place at D., in which the Catholics, under the constable Montmorency, defeated the Huguenots, and took their leader, the prince of Condé, prisoner.

DREW, a co. in s. e. Arkansas, on Bartholomew bayou and the head waters of Saline river; area recently diminished to form another co.; 802 sq.m.; pop. '90, 17,302. It is level and fertile, much of it covered with cypress and ash forests. Productions: corn, cotton, etc. Co. seat, Monticello.

DREW, DANIEL, 1797-1879; b. N. Y. He began life as a drover and dealer in cattle; soon went into the steamboat business, and afterwards into railroads, and became known as one of the boldest and sharpest speculators in stocks, winning and losing several fortunes. He was always interested in the prosperity of the Methodist Episcopal church, and in proof of that interest founded the Drew ladies' seminary, at Carmel,

N. Y. (his native town), and the Drew theological seminary, at Madison, N. J. Not long before his death he lost his estate.

DREW FAMILY, THE, remarkable in the annals of the American stage. Its best-known members are (1) JOHN DREW, SR., b. in Ireland, Sept. 3, 1825; came to America, where he made his first appearance at the Bowery Theatre, N. Y., in 1845. From 1845 to 1855 he played in the principal American cities; visited England in 1855, Australia in 1859, and died in 1862. (2) MRS. JOHN DREW (Louisa Lane), the daughter of a London actor, b. in London in 1820; came to America in 1827, and appeared in child parts in 1828. Five years later she acted the parts of "Julia," in *The Hunchback*, and "Lady Teazle," in *The School for Scandal*. She was married three times—her third husband being Mr. John Drew. In 1882 she first took the part of "Mrs. Malaprop" in *The Rivals*, her greatest success. She managed and largely owned the Arch St. Theatre in Philadelphia. (3) JOHN DREW, son of the preceding, b. in Philadelphia in 1853. He early appeared upon the stage, and has won remarkable success as the *jeune premier* of Mr. Augustin Daly's company. (4) GEORGIE DREW (Barrymore), sister of the preceding, b. about 1858, married to Maurice Barrymore the actor, and herself an actress of much vivacity and talent. She died in 1893.

DREW THEOLOGICAL SEMINARY, for the education of ministers of the Methodist Episcopal church, was founded at Madison, N. J., in 1866, by Daniel Drew, a New York capitalist, who gave about \$500,000 to the institution. It was organized under the supervision of the Rev. Dr. John McClintock, its first president. The institution is handsomely located within one hour of New York city, in an extensive park, with superior library building, dormitories, and residences for the faculty. In 1897 it had 6 professors and 133 students; president, Henry A. Buttz, D.D.

DREYSE, JOHANN NIKOLAUS VON, 1787-1867; a native of Saxony, inventor of the needle-gun. He was the son of a locksmith, and followed the business, adding the manufacturing of tools. In 1836, he completed his invention of the needle-gun, which arm was a few years afterwards supplied to all the German troops. He and his family were ennobled in 1864.

DRIFT, a name given to the boulder-clay, a deposit of the pleistocene epoch. More fully, it is called the northern drift, glacial drift, or diluvial drift, in allusion to its supposed origin. For an account of the formation, see BOULDER-CLAY.

DRIFT-WOOD is wood carried by tides and currents to a distance from its native locality. Specimens thus transported have been observed in the marine strata of the chalk, London clay, and other formations.

SAND-DRIFT is sand driven and accumulated by the wind. Deposits thus formed are occasionally found among the stratified rocks, but compared with other strata they are few, though, from their anomalous character, an acquaintance with their phenomena is of importance to the geologist. Moving sands are at the present day, in many places, altering the surface of the land. In the interior of great dry continents, as Africa, India, and Australia, extensive districts are covered with moving sands. The continuous blowing of a steady wind in one direction often covers a rich tract with this arid material. But the influence of the wind on loose sand is most evident along low sandy coasts, where hills, called "dunes," are formed entirely of it; they sometimes attain a considerable height, as much, for instance, as 200 or 300 feet. Dunes are advancing on the French coasts of the bay of Biscay at the rate of about 60 ft. per annum, covering houses and farms in their progress. Similar accumulations are forming on the coasts of Nairn, Cornwall, Wexford, and other parts of the British isles. The Culbin sands, in Nairnshire, cover a large district which at a period not very distant was rich arable land. The prevailing wind is from the w., hence the hills are slowly moving in an easterly direction, at the rate of a mile in somewhat less than a hundred years. A singular stratification exists in these hills. The prevailing w. wind lifts, or rather rolls the particles of sand up the gentle incline of the western aspect of the hill, until they reach the summit, where they fall, forming a steep declivity to the e., equal to the angle of repose for sand. A shower consolidates the surface of the new bed, or a land-breeze carrying the fine dust separates it by a very thin layer of finer material from the one that follows, and thus, as the hill moves eastward, a regular series of strata is formed at a very high angle. Little can be done to arrest the progress of these devastating sand-drifts. It has been recommended to plant *carex arenaria* and similar sand-loving plants, which have long creeping roots: they certainly check to a considerable extent the influence of the wind.

DRILL, *Cynocephalus leucophæus*, a species of baboon (q.v.), a native of Guinea, similar to the mandrill, but rather smaller and less ferocious.

DRILL is a general name for the exercises through which soldiers and sailors are passed, to qualify them for their duties. It is subject to numerous varieties, according to the number and organization of the men drilled at one time, and the kind of weapon to which the exercises relate. The infantry, the cavalry, and the artillery, all have different kinds of drill. The militia and the volunteers differ from the regulars, if not in the kind of D., at least in the circumstances under which it is carried on; the squad-drill, company-drill, and battalion-drill, vary both in the numbers concerned and in the routine of exercises. And so likewise in the navy, the drilling of seamen varies in kind, according to the duties likely to be required. See MANUAL, TACTICS.

Manuals of D. have been prepared for all the various branches of the two services. Drill-halls, in which D. can be carried on comfortably in any kind of weather, are now common.

DRILL, a fine linen fabric of a satiny finish, used for summer dress for gentlemen. Drills are worked with five shafts, except fancy patterns, which are wrought with eight shafts.

DRILLING—DRILL. Drilling is the name applied to the mode of sowing in regular rows, as distinguished from broadcast sowing, and the drill is the name of the implement employed in this process; the term *drill* is also frequently applied to a row of drilled crop, as a drill of potatoes, corn, or turnips. In all countries in which maize and Indian corn are grown, the principle of drilling has been long known and acted upon. In gardening it has been practiced everywhere from time immemorial; but its extension to field-culture is comparatively of recent date. Jethro Tull invented a drilling-machine in the early part of last century, and did much to show its merits in the culture of grain and root crops. Since his time, the use of this implement, in the case of both white and green crops, has in many districts become general. The crops which are now most generally drilled, are clover, flax, cereals, beans, pease, potatoes, turnips, beet-root, cole-seed, and carrots. Of these, clover and flax are sown in drills at about 3 or 4 in. apart; cereals from 6 to 12 in.; and beans, potatoes, and turnips at from 25 to 30 in. apart; the general rule, however, with most green crops, being that the space between the rows should admit of the passage of a light plow or hoe, drawn by a horse, without danger to the plants. A great variety of drills are now in use. The system of lifting the grain in small cups and conveying it to the coulter has been long in use. Garrett of Saxmundham, Suffolk, and Hornsby of Grantham, are favorite makers of corn and turnip drills. Latterly, R. Reid & Co. of Aberdeen have acquired fame with their patent disk corn-drill, which is popular in Scotland and some parts of England. One powerful recommendation of drilling is, that by means of it a considerable saving of seed is effected in the sowing of white crops; but the great advantage is, that in the case of green crops, it enables the farmer more readily to clean the land, both by the hand and by the horse hoe. About one-half the seed suffices when deposited by the drill-machine, compared with what the hand-sowing requires, and the seed is more regularly spread and better covered. The braid comes up more uniformly, and the straw is stronger and stiffer. Drill-sowing is slow work, but it is so efficient that it is gaining on the broad-cast. To keep the soil stirred and pulverized, which can only be properly done where the crops have been drilled, favors the retention and absorption of the moisture.

In England, turnips are sometimes drilled by a machine on the flat; while in Scotland, they are always sown on ridges or drills formed by the double-molded plow. The double-board or drill plow is to be found now on almost every farm, and its introduction has saved much labor. Turnip-sowing machines which take two drills at the time have been common for years, and potato-planters taking two rows at the stripe are being introduced, but have not been established yet. One of these was tried, with interest and success, at the Royal English Show, held at Hull, in 1873.

DRILLS are tools used for boring or drilling holes in metal, bone, ivory, hard woods, etc. They are usually made of a square steel bar, flattened out at the cutting end; this part is brought to an angular point like a spear-head, and the cutting edges forming the angle are beveled in opposite directions. Those which have a projecting pin in the center, and chisel-shaped cutting edges on each side of the pin, are called "center bits." There are various contrivances by which the drills are made to revolve. For drilling iron, steel, and large brass work, the lathe is commonly used, the drill being fitted into a square-hole chuck, and the work pressed against it while revolving by the screw and center of the puppet. The *brace or drill-stock* is commonly used by carpenters for center bits, and occasionally for metal work. This is a curved handle, which is made to revolve by the hand, while one end is pressed against the chest. The best and most generally used drills for small boring are called twist drills, which have many advantages over the flat drills described above. Twist drills are made from steel rods of uniform diameter through their length. Upon the rod two spiral grooves are cut, each starting at the cutting edge at diametrically opposite points. At the end of the drill the grooves almost meet in the center of the rod, but grow shallower as they continue. The cutting edges are ground on the end of the rod and the borings escape through the grooves, which constantly carry them away from the cutting edge, thus preventing clogging.

DRIMYS. See WINTER'S BARK.

DRINKING USAGES. Some of these are of great antiquity, and all are interesting in connection with the history of manners. Besides sacrifices of animals and articles of food, the Hebrews made drink-offerings a solemn religious service. To mark the spot where he communed with God, Jacob set up a pillar of stone, and "poured a drink-offering thereon."—Gen. xxxv. 14. We learn that such sacrifices were not made alone to the true God; for women are said to have poured out "drink-offerings unto other gods."—Jer. vii. 18. Such a statement is amply verified by pagan writers. Among the Greeks and Romans, the pouring out of a libation to the gods was a common religious observance. A libation was made on the occasion of solemn prayers, and also

before meals. These libations were usually of undiluted wine, but they were also sometimes of milk diluted with water, or water flavored with honey. There are many references to these libations by Sophocles, Æschylus, Pliny, and other writers. The libation at meals consisted of pouring a small quantity of liquor from the cup on the ground—so much waste being a kind of propitiation, or an act somewhat equivalent to the asking of a blessing. See SACRIFICE.

From these and similar usages in remote times sprung the ceremonial observance of drinking healths, or the uttering of a pious, heroic, or friendly sentiment before quaffing liquor on festive occasions. It has been stated that the practice of saying, or pledging "I pledge you," originated in England in the 10th c., it being then necessary for one to watch over the safety of his companion when the cup was at his lips. But the custom of drinking healths, as just mentioned, is of far higher antiquity, and was derived immediately from the boisterous convivialities of a Scandinavian and Teutonic ancestry (see *WALHALLA*), if not with equal likelihood from the usages of the early Britons, who were of Celtic origin. A story is told of a feast given by Hengist (5th c.) at his stronghold of Thong-caster, in Lincolnshire, to the British king Vortigern, and of the bewitchment of the royal guest by the charms of Rowena, the young and beautiful daughter of his entertainer. Rowena's address, as she gracefully knelt and presented the wine-cup to the king, *Liever kyning, wass heal*, or, "Dear king, your health," is often quoted as the origin of our still existing expressions, wassail and wassail-cup; though wassail means pledging or health-drinking independently of the saying of Rowena, and certainly was not then uttered for the first time. Wassail is derived from the old Anglo-Saxon *Wes heil*, "Be in health;" and *Wes heil* and *Drinc heil* were the usual ancient phrases in quaffing among the English, and synonymous with "Here is to you," and "I'll pledge you," of later times. The explanation of wassail by an old writer, Robert de Brunne, may be appropriately quoted:

"This is ther custom and her gest
When thei are at the ale or fest,
Ik man that levis qware him think
Salle say *Wosseille*, and to him drink.
He that biddis salle say, *Wassaile*,
The tother salle say again, *Drinkaile*.
That says *Wosseille* drinks of the cop,
Kissand his felaw he gives it up."

The learned Selden, in a note on the *Polyolbion*, says: "I see a custom in some parts among us; I mean the yearly was-haile in the country on the vigil of the new year, which I conjecture was a usual ceremony among the Saxons before Hengist, as a note of health-wishing (and so perhaps you might make it wish-heil), which was exprest among other nations in that form of drinking to the health of their mistresses and friends. 'Bene vos, bene nos, bene te, bene me, bene nostram etiam Stephanium,' in Plautus, and infinite other testimonies of that nature in him, Martial, Ovid, Horace, and such more agreeing nearly with the fashion now used: we calling it a health, as they did also in direct terms." For further particulars concerning wassail and wassail-bowl, we may refer to Brand's *Popular Antiquities*, edited by Ellis. It is enough here to quote from that authority the following passages: "Milner on an ancient cup (*Archæologia*, xi. 420), informs us that 'the introduction of Christianity amongst our ancestors did not at all contribute to the abolition of the practice of wasselling. On the contrary, it began to assume a kind of religious aspect, and the wassel-bowl itself, which in the great monasteries was placed on the abbot's table, at the upper end of the refectory or eating-hall, to be circulated amongst the community at discretion, received the honorable appellation of "poculum charitatis." This, in our universities, is called the grace-cup.' The poculum charitatis is well translated by the toast-master of most of the public companies of the city of London by the words a 'loving cup.' After dinner, the master and wardens 'drink to their visitors, in a loving cup, and bid them all heartily welcome.' The cup [a silver flagon containing warm spiced wine] then circulates round the table, the person who pledges standing up whilst his neighbor drinks to him."

While the drinking of healths is thus of old date, the application of the word "toast" is modern, having had its origin in the practice of putting a piece of toasted bread in a jug of ale, hence called "a toast and tankard." The custom of so using the word is said to have had its rise at Bath, in the reign of Charles II. It happened that on a public day a celebrated beauty of those times was in the cross [or large public] bath, and one of the crowd of her admirers took a glass of the water in which the fair one stood, and drank her health to the company. There was in the place a gay fellow half-tipsy, who offered to jump in, and declared, though he liked not the liquor, he would have the toast. He was opposed in his resolution; yet this whim gave foundation to the present honor which is done to the lady we mention in our liquors, who has ever since been called a toast.—*Tatler*. Begun in the form of toasting beauties at private parties, toasts were in time given on all sorts of subjects at public festivities, accompanied with rounds of cheers and hurrahs, these noisy demonstrations being now called "the honors." The fatigue of announcing these exciting sentiments is so great, that in all well-ordered large assemblies a toast-master is employed. Standing behind the chairman, this official, besides proclaiming the toasts, acts as a fugleman to regu-

late the clapping of hands and the "hip, hip, hurrahs" of the company. "Toasts, certainly, in this guise look more like a medium for taking an indefinite quantity of wine, than that spontaneous effusion of the heart in honor of some cherished individual, which they originally were. On certain occasions, these signals are hushed, and the convivial glass is taken "in solemn silence." The effect is certainly rather startling. A convivial glass to the memory of one departed has surely something in it of practical absurdity."—Mrs. Stone's *Chronicles of Fashion* (1845). The absurdity of the whole toasting system has incurred the reprehension of temperance societies, without any perceptible abatement; but the old custom of drinking healths at private parties is now given up in good society, along with the excesses which were formerly practiced.

Space is not afforded in the present work to do more than glance at the diversity of D. U. in connection with domestic events and social intercourse. There were, as is well known, at one time drinkings on the occasion of births, baptisms, marriages, and even deaths; these last, which included the gloomy festivities of the *Lykwake*, or wake over the corpse of the deceased, being a relic of a very ancient custom, as was that, at least in Scotland, of drinking the *dredgy* (dirge) after the funeral solemnities were completed. In whatever manner these, as well as many other D. U., originated, it cannot be doubted that they were long maintained from the force of custom, along with that demand for artificial stimulus provoked by the naturally phlegmatic character of a northern people. For the long nights of a cheerless climate, there seems to have been sought the solacement of those intoxicating agents, in which it would have been fatal to indulge—where they were not needed—under the sunny skies of the south. We believe this is really the philosophy of the subject, if there be any philosophy in it; and it cannot fail to be observed, that just in proportion to an increase in the number of comfortable homes, the cultivation of mental resources, and the spread of a taste for harmless recreations, the more odious of the old convivialities disappear. Latterly, many amusing traditions respecting the drinking habits of a past age in Scotland, where they longest flourished without alteration, have been given in the *Memoirs of Lord Cockburn*; the *Autobiography of the Rev. Dr. Alexander Carlyle*; and the *Reminiscences of Scottish Life and Character*, by the Very Rev. Dean Ramsay (1860).

As regards miscellaneous drinking observances at one time common, we can refer but to a few of the more prominent. Perhaps the most offensive of all was that customary among tradesmen of imposing fines to be consumed in liquor. Apprentices, on being introduced to a workshop, paid so much entry-money to be spent in drink, and similar exactions were made from journeymen on entering a new employment. This was called paying their *footing*. When Benjamin Franklin, on his getting employment in a printing-office in London, refused to comply with this mischievous custom, he experienced, as he tells us, a variety of petty annoyances. Among shipwrights, the penalty of non-payment was flogging with a hand-saw from time to time, and other maltreatment. We refer to Dunlop's *Drinking Usages of Great Britain* (1839) for many curious details of this kind. Happily, the abolition of these usages has kept pace with the increasing intelligence of the working-classes, and of such outrages little is now heard. Prisoners, on being lodged in jail, as related in the novels of Smollett and others, were obliged to pay *garnish* for drink to the brotherhood of which they had become members. This pitiless exaction is now totally gone, through the efficacy of modern prison-discipline.

The giving of *vails* (Lat. *vale*, farewell) to servants on quitting a gentleman's house, which became so intolerable in the 18th c., as at length to be given up by universal consent, meant, doubtless, a gift to be spent in drink to the health of the donor, and was analogous to the custom of giving a *trink-geld* in Germany, and a *pour boire* in France, to servants, drivers of carriages, and others. There were, at one time, numerous drinking usages connected with departures. We need only notice the *bonaville* (Fr. *bon allez*), or, as it is sometimes called, a *foy* (Fr. *voie*), a festive drinking at the away-going of servants or of persons in a still higher degree, once common in the lowlands of Scotland; also the *stirrup-cup*, or, as it is called in the Highlands, *deoch an dorris*, or drink on getting on horseback, and being ready to set off.—For the moral and physical evils connected with D. U., and the means taken to redress them, we refer to the article TEMPERANCE.

DRIP, the projecting edge of a molding, so channeled as that the rain will drip from it instead of trickling down the wall.—*Parker*.

DRIPSTONE (Fr. *larmier*). The D. is a projecting molding or tablet placed over the head of a Gothic doorway or window, for the purpose of throwing off the water, whence it is also known as a water-table or weather-molding. Though such was, no doubt, its primitive use, the D. latterly became a mere ornamental appendage, which served to enrich and define the outline of the arch. It does not generally extend lower than the springing of the arch, though this rule is by no means without exceptions. When the tracery extends to a lower level, the external D. usually accompanies it, and Parker mentions that, at the n. doorway of Otham church, Kent, it descends the whole length of the jamb. The D. is not so constant a feature in continental as in English Gothic.

DRISLER, HENRY, LL.D., born 1818; graduated at Columbia College, 1839, and was instructor in the grammar school there for several years; then teacher of Greek and Latin; in 1845 adjunct professor in the same department; in 1857 professor of Latin, and in 1867 of Greek. In 1878, during President Barnard's absence in Europe, he was president *pro tem.* of the college. He had also for several years assisted Prof. Anthon in editing his classical text-books. Besides many minor contributions to linguistic study, he has edited (1846) Liddell and Scott's translation of Passow's Greek Lexicon, and (1870) an enlargement of Yonge's English-Greek Lexicon.

In 1878 he edited the first of a series of classical texts and commentaries written by a number of eminent classical scholars. In 1882, in conjunction with the English editors, he brought out an enlarged edition of Liddell and Scott's Greek Lexicon, which appeared simultaneously in England and in this country. In 1886 he received from Harvard the honorary degree of LL.D. In 1888, on the resignation of President Barnard, Dr. Drisler acted as president for one year, at the end of which period he was made Dean of the Faculty of Arts. He retired in 1894.

DRIVER, on shipboard, is the name of a large sail occasionally set upon the mizzen-mast with a yard or gaff. A boom, called the *driver-boom*, extends the lower part of the sail a good way over the stern, like a cutter's mainsail.

DRIVING, FURIOUS. Travelers shall drive on the highway only at a moderate rate of speed, and furious and reckless driving on thronged thoroughfares is an indictable offense at common law, punishable by fines and imprisonment. In the United States the rate of driving in cities is, in the absence of state laws, regulated by the municipalities. The offense has become statutory in England, and a series of acts have been passed, under which prosecutions are now usually brought. See **RULE OF THE ROAD.**

DROGHEDA (Ir. "bridge of the ford"), a well-built municipal burgh and seaport, in a county by itself of 9 sq. m., on the borders of Meath and Louth, on both sides, but chiefly n. of the Boyne, 4 m. from its mouth, and 31 m. n. of Dublin. The Dublin and Belfast railway crosses the Boyne here by a viaduct 95 ft. high. There are linen and cotton manufactures, tanning and brewing works, and an iron foundry. It has a considerable trade, chiefly with Liverpool, 140 m. e.s.e. principally in corn, meal, flour, cattle, provisions, linen, hides, and butter. Great quantities of ale are sent to the colonies. Each census since 1841 shows a falling off in the population. At that date it contained 17,300 inhabitants, while in 1891 the population numbered only 11,812. Till 1885, D. sent one member to parliament. The parts of D. on the opposite sides of the river formed two opposing corporations till 1412, when a sermon by a monk induced them to get a charter of union from Henry I. From the 14th to the 17th century, D. was the chief military station in Leinster. Many parliaments were held in D., and it had the right to coin money. In 1649, Cromwell stormed D. and put 2,000 of the garrison to the sword. Poyning's laws were enacted here. D. surrendered to William III. the day after the battle of the Boyne, which was fought in 1690 at Oldbridge, 4 m. w. of Drogheda. One of the four ancient gates of D. still remains, and the ruins of many friaries and monastic institutions. Frequent cattle fairs are held here.

DROGUE AMÈRE (Fr. bitter drug) a celebrated stomachic bitter; of which the basis is creat root, and the other ingredients mastic, frankincense, myrrh, and aloes, all steeped for about a month in brandy, which is then strained and bottled.

DROHOBICZ, a t. of Austria in the province of Galicia, is situated on the Tyszmanika, a tributary of the Dniester, in lat. 49° 25' n., and long. 23° 30' east. The town is in general ill-built, but it contains several interesting edifices, including a Basilian monastery, a castle, a high school, and two very handsome churches. D. has extensive salt-works, and supplies large quantities of ozokerit. There are also in the vicinity iron-mines and pitch-wells. D. has likewise a good trade in wine, linen, cotton, leather, and groceries. It has, besides, corn and cattle markets. Pop. '90, 17,784.

DROIT D'AUBAINE (Lat. *alibi nati*). By the old custom of France, the king was entitled, on the death of a foreigner who had taken up his fixed residence there, to claim his movable estate, notwithstanding any testamentary settlement which he might have left. But when a foreigner went to France as a traveler, merchant, or foreign minister without any intention of fixing his residence there, the droit d'aubaine was excluded. The Swiss, Savoyards, Scotch, and Portuguese were exempted. This antiquated piece of injustice was abolished in 1819.

DROITS OF THE ADMIRALTY. Certain rights or perquisites formerly pertaining to the British Admiralty (q. v.) arising from subjects within its jurisdiction, as wrecks, derelicts, and, under certain circumstances, detained or captured ships of the public enemy. These rights now accrue to the national exchequer.

DROITWICH, a municipal borough in Worcestershire, 7 m. n.n.e. of Worcester, in the narrow valley of the small river Salwarp, on the Bristol and Birmingham and West Midland railway, and on a canal connected with the Severn, which admits vessels of 60 tons. It gives its name to a parliamentary division. It has direct communication, also, by means of other canals, with Birmingham and London and the intermediate district. Its chief trade is salt, for which it has been famous from remote times, and which is esteemed the best in Europe. In the middle of the town, rising from a

depth of 200 ft., through beds of new red sandstone and gypsum, are the celebrated wycles, or brine-springs, yielding annually large quantities of salt, part of which is exported to foreign countries. Pop. '91, of the municipal borough, 4,021; of the parliamentary division, 48,700. D. sends one member to parliament. It was the Roman *Salinæ*. The remains of a villa were found here, with tessellated pavements, etc.

DRÔME, a department of France, on the e. bank of the Rhône, to the s. of the department of Isère. Area, 2,500 sq. miles. Pop. '96, 303,491. In the w. of the department, running from n. to s. along the Rhône, stretches a sandy plain of 5 to 8 m. in breadth, but toward the e. the surface is hilly, a spur of the Alps traversing the eastern boundary, and sending offshoots of about 3,500 ft. in average height westward across almost the entire area of Drôme. These heights, whose sides are covered with forests of pine, oak, and beech, afford excellent pasturage in summer and autumn. The general direction of the rivers of D. is westward, toward the Rhône, and the most notable of them are the Drôme, from which the department takes its name, and the Isère. Vines and mulberry, chestnut, walnut, and olive trees are extensively grown. Many of the vineyards are famous, but perhaps the most celebrated is that of L'Hérmitage, near Tain, on the banks of the Rhône, which yields red and white wines hardly surpassed by any in the world. The vine culture, however, has been greatly retarded by the phylloxera. In the production of mulberry leaves and in silk-worm culture it is one of the leading departments in France. The manufactures consist chiefly of woolen cloth, silk, hosiery, serge, and cotton yarn. The department is traversed by the Lyon and Avignon railway. It is divided into the four arrondissements of Valence, Montélimart, Die, Nyons, with the town of Valence for capital.

DROMEDARY, a name sometimes given, probably at first through mistake, to the Arabian or one-humped camel (*camelus dromedarius*), but properly belonging to a variety of that species, distinguished by slenderness of limbs and symmetry of form, and by extraordinary fleetness. It has been well described as "bearing much the same relation to the ordinary camel as a race-horse or hunter does to a cart-horse." The word dromedary is derived from the obsolete Greek *dremo*, to run. The pace of the D. is a trot, which it can maintain without intermission for a prodigious length of time; often at the rate of 9 m. an hour for many hours together; whilst a journey of upwards of 600 m. is performed at a somewhat slower rate in five days. Even its more rapid pace can be maintained for twenty-four hours at a stretch, without sign of weariness and without stopping to bait; and if then it is allowed a little refreshment, of a ball of paste made of barley and powdered dates and a little water or camel's milk, it will resume its journey, and go on with undiminished speed for twenty-four hours more. The jolting to the rider is terrible. The gallop is a pace unsuitable to the D., and at which it very soon fails. Dromedaries are sometimes trained to run races. White dromedaries are particularly prized in some parts of the east. See CAMEL.

DROMORE (*Druim Mor*, Great Ridge), an episcopal city in Ireland, in the co. of Down, on the Lagan, 16 m. s.w. of Belfast. It has linen manufactures. Pop. about 2,500. In the peat-bogs here were found the remains of an elk, the space between the extremities of whose horns measured 10 ft. 3 in. North of D. is a mound or rath, 60 ft. high, with three concentric intrenchments, and great outworks towards the Lagan. The see of D. was founded by St. Colman in the 6th c., but is now united with those of Down and Connor. It has a cathedral in which Jeremy Taylor, who was bishop of D., is buried.

DRONE. See BEE.

DRONE. See BAGPIPE.

DRONTHEIM. See THRONDHJEM.

DROORAJAPATAM, or DOOGORAUZEPATAM, a t. on the Coromandel coast of Hindustan, possesses remarkable facilities for navigation, both maritime and inland. It stands on an inlet, which connects Blackwood harbor with Pulicat lake, the former being the only safe haven on the w. side of the bay of Bengal.

DROPSY (Gr. *hydrops*, from *hydor*, water), a class of diseases always of serious import, though not often, perhaps, directly fatal. D. is rather a symptom than a disease; it consists of the effusion of watery fluid from the blood into the skin and subjacent textures, or into the cavities of the body. When the effusion is chiefly in the superficial parts, the D. is called *anasarca* (*ana*, upon; *sarx*, the flesh); when it is in the abdomen, it is termed *ascites*; when in the chest, *hydrothorax*. D. most commonly depends on disease of the heart (q.v.) or kidneys (q.v.); in cases of *ascites*, the liver and spleen are often at fault. The treatment of D. is chiefly by diuretics (q.v.), and other evacuant remedies, which remove the fluid from the textures by unloading the blood of its excess of serum. It is, however, a matter of some difficulty to find the proper remedy in each individual case. In all cases of D., the internal organs should be, if possible, submitted to a strict medical examination, and the treatment regulated accordingly. It cannot be too clearly borne in mind by all that a dropsy is a transudation and not an exudation, and is not a direct product of inflammation, as the latter is. For instance, the fluid which is poured into the cavity of the pleura in pleurisy is not a dropsy, but an exudation of plastic material from the blood, which has the prop-

erty of becoming organized into a kind of pseudo-tissue which forms adhesions between the lungs and the sides of the chest. In dropsy, the fluid has no power of organization, although it contains a slight portion of constituents of blood serum. Exudations have a turbid appearance when they are not colored with the red corpuscles of the blood, but the effused transuded fluid of dropsy is usually quite transparent, although sometimes tinged with the coloring matter of the blood. As a rule, dropsies are caused by obstructions to the return of blood by the veins, and may be general or local. In general dropsy there is an accumulation of watery fluid into the cellular tissue of a part or whole of the body, together with a transudation into one of the serous cavities. Such dropsies are apt to follow diseases of the heart (q.v.). Again, general dropsy may be owing to a morbid condition of the blood in diseases of the kidney (q.v.). It is then called *renal dropsy*, while that caused by disease of the heart is called *cardiac dropsy*. Local dropsies, when existing in the cellular tissue, are circumscribed. Thus, anasarca confined to the limbs would be called a local dropsy, whereas when spreading over the whole body it would be called general, although the cellular tissue only is invaded. For the causes of dropsy of the belly, or *ascites*, see more particularly LIVER, DISEASES OF THE. But ascites, as well as dropsy of other cavities than the peritoneum, may be the result of scarlet fever, which has for one of its sequelæ inflammation of the kidneys. The pressure of a tumor may cause dropsy. Pressure upon the portal vein may be followed by ascites; upon the ascending *vena cava*, or great vein which carries the blood from the trunk and lower extremities to the heart, anasarca of the trunk and lower extremities. When the pressure is upon one of the iliac veins, anasarca of one of the lower limbs is the consequence. The treatment of dropsy depends upon the condition of the organs or parts of the body where morbid condition is its cause. Renal dropsy, besides general treatment, will require remedies calculated to relieve the renal disease, and a similar remark applies to hepatic dropsy. The general treatment for all forms of dropsy includes sometimes the removal of the watery fluid from the serous cavities, and also from the cellular tissue. This is sometimes accomplished by tapping, or *paracentesis*, when the liquid is drawn from a cavity; when from the abdomen, *paracentesis abdominalis*; when from the chest, *P. thoracis*; when from the head, *P. capitis*. The withdrawal of the liquid from the cellular tissue is performed by making numerous small punctures. The therapeutical remedies consist of diaphoretics, diuretics, and cathartics; and although they are often employed with more or less benefit, and sometimes assist in recovery, they frequently fail to give the hoped-for relief. Cathartics, especially those which belong to the class called *hydrogogue*, often reduce the amount of liquid considerably; but it generally returns, especially in incurable cases, and the patient is made weaker by the operation; and similar objections hold with regard to diuretics; they often relieve for a time, but are perhaps quite as often unsatisfactory. Both remedies in unfavorable cases may be called necessary evils. Diaphoretics may be given with more freedom, although the objection that they promote debility to a certain extent applies to them also. The use of jaborandi, or its alkaloid, which has been recently introduced into practice in this country, is perhaps attended with more benefit than that of any other diaphoretic. (See JABORANDI.)

DROPWORT. See SPIRÆA and WATER DROPWORT.

DROSERA CÆÆ, a natural order of exogenous plants, consisting entirely of herbaceous plants, which generally inhabit marshy places, and are often covered with glands. The leaves are frequently all radical, and they and the flower-stalks are rolled up in bud like the fronds of ferns. There are 5 sepals, 5 petals, 5, 10, 15, or 20 stamens; the fruit a one-celled capsule, with numerous seeds. About 100 species are known, distributed over most parts of the world, many of them plants of very delicate appearance; and many of them, as the species of *drosera* or SUNDEW, natives of Britain, are remarkable for their glandular hairs, which secrete a viscid fluid, and by means of it often fatally detain flies which alight on them. *Rosicula dentata* is placed in houses in s. Africa on this account. Venus' fly-trap belongs to this order. See DIONÆA. Acrid and stimulant properties prevail in the droseraceæ.

DROSOMETER, an instrument for measuring dew. It is a simple balance in even poise, on one scale of which the dew falls, while the other is protected. The weights on the dry scale indicate the amount of dew on the wet scale.

DROSTE-HÜLSHOFF, ANNETTE ELIZABETH, a distinguished lyric poetess of Germany, b. 10th Jan., 1797, on the estate of Hülshoff, near Münster. Of a delicate constitution, and living in complete seclusion from the world, she nevertheless received an excellent scientific education. In the year 1825, she was first introduced into a wider circle of distinguished men and women at Cologne and Bonn, but in a short time retired again to her maternal estate of Rischhaus, near Münster, where she lived almost exclusively for science, nature, and poetry. She died at a place near lake Constance, 24th May, 1848. While occupying a distinguished place among the literary women of the time, she retained all the characteristic timidity of her sex, avoiding those eccentricities into which many women fall who think they have a mission to regenerate society. Her *Gedichte* (Poems) appeared at Stuttgart in 1844, and of her posthumous works *Das geistliche Jahr nebst einem Anhang religiöser Gedichte* at Stuttgart in 1852.

The poems are not only perfect as regards form, but unite a womanly gentleness and poetical creative power in a degree seldom seen in the writings of women.

DROUET, JEAN BAPTISTE, Comte d'ERLON, French marshal, was b. 29th July, 1765, at Rheims, entered a regiment of volunteers in 1792, and took part during the years 1793-96 in the campaigns of the Moselle, Meuse, and Sambre. His important services quickly obtained him promotion. His conduct in the peninsular war was highly distinguished, and elicited the warmest eulogiums from Massena. After the fall of Napoleon, the Bourbons tried to secure his services, and gave him the command of the 16th division, but he was shortly after arrested on the charge of conspiring against the royal family. Managing to escape, he remained in concealment in Lille until the return of Napoleon from Elba, when, putting himself at the head of the troops, he seized the citadel and held it for the emperor, who made him a peer of France. At the battle of Waterloo he commanded the first *corps d'armée*. After the capitulation of Paris, he fled to Bavaria, where he resided until the July revolution, when he returned to France, and received in 1832 the command of the army of Vendée. During 1834-35, he held the important office of governor-general of Algeria, and in 1843 was elevated to the rank of marshal. D. died 25th Jan., 1844.

DROUYN DE LHUYS, EDOUARD, an eminent French diplomatist and politician, was b. at Paris, Nov. 19, 1805, and studied at the college of Louis-le-Grand and the Ecole de Droit. He was at first attached to the embassy at Madrid, whither he proceeded in 1830. In 1840, he was placed at the head of the commercial department under the minister of foreign affairs, and shortly after was elected *député* for Melun; but taking a part hostile to the government, of which he was a subordinate member, he was deprived of his situation by M. Guizot. This gave him fuller scope for the advocacy of his political opinions. He now became an active member of the *Reforme* party, and after the famous banquet of the 12th arrondissement had been interdicted, he signed, along with the other chiefs of the opposition, the accusation drawn up against M. Guizot and his colleagues. Elected representative of the people to the constituent and legislative assemblies, by the department of Seine-et-Marne, he was made first a member and then president of the committee of foreign affairs. Here he acted generally with the moderate party. In the first cabinet formed by Louis Napoleon after his election to the presidency (Dec., 1848), he became minister of foreign affairs, and directed the French policy in all the difficult European complications of the year. In 1849, he went to London for a short time as ambassador, and after the *coup d'état* became one of the vice-presidents of the imperial senate, and again minister of foreign affairs. Being disappointed at the issue of the Vienna conferences in 1855, he resigned his office. In 1863, he was recalled to his old post, resigning again in 1866. On the fall of the empire, he fled for a time to Jersey. He d. 1881.

DROWN, THOMAS MESSINGER, chemist, was born in Philadelphia, Penn., March 19, 1842. He graduated at the Philadelphia high school in 1859, and received his degree of doctor of medicine from the University of Pennsylvania in 1862. He studied at Freiberg in Saxony and at the university of Heidelberg. He was instructor of metallurgy in Harvard, 1869, and in 1874 was appointed to the chair of analytical chemistry in Lafayette college. In 1885 he received the same chair in the Massachusetts Institute of Technology. He has published many papers on metallurgy and chemistry.

DROWNING. See ASPHYXIA.

DROWNING, as a mode of capital punishment, has only lately ceased in Europe, and is probably still in use in some other quarters of the world. Tacitus, writing about the end of the 1st c., tells us that the Germans hanged their greater criminals, but that meaner and more infamous offenders were plunged under hurdles into bogs and fens. By the law of the ancient Burgundians, a faithless wife was to be smothered in mud. The Anglo-Saxon codes ordered women convicted of theft to be drowned. The punishment was in such common use throughout the middle ages, that grants of capital jurisdiction ran "*cum fossa et furca*," i.e., "with pit and gallows." The pit, ditch, or well, was for drowning women; but the punishment was occasionally inflicted on men. The doom of the parricide was to be put into a sack and cast into the sea. A canon of Prague, afterwards enrolled in the catalogue of saints, was drowned in 1383, for refusing to reveal the secrets of the confessional. In this instance, perhaps, drowning was allowed to the offender as a matter of favor. So in Scotland, in 1556, a man convicted of theft and sacrilege, was sentenced to be drowned, "by the queen's special grace." So lately as 1611, a man was drowned at Edinburgh for stealing a lamb. By that time, the punishment of drowning had become obsolete in England. It survived in Scotland until 1685. The last execution by drowning in Switzerland was in 1652, in Austria in 1776, in Iceland in 1777. It was abolished in Russia early in the 18th century. In Saxony, a woman convicted of child-murder, was sewn up in a sack, along with a cat, a dog, and a snake, and thus drowned, in 1734.

DROYLSDEN, a large and rapidly increasing Lancashire township, a district parish of Manchester, and 4 m. e. from Manchester, a station on the Lancashire and Yorkshire railway. It is situated on an elevated plain, is irregularly built, the houses of brick,

but many of them very neat. The cotton manufacture is extensively carried on; there are also print-fields, dye-works, and copperas-works. Pop. '81, 8679; '91, 9482.

DROYSSEN, JOHANN GUSTAV, b. 1808; a German historian, studied at Stettin and Berlin, teacher in a gymnasium in the latter city, and private tutor in the university. In 1840, he became professor of history at Kiel, and was prominent in politics during the struggle between Denmark and the duchies, being the author of the *Kiel Address*, and one of the nine protesting professors of the university. He was a representative from Kiel in the diet of Frankfort, and subsequently a member of the Frankfort parliament. In 1851, he was professor of history at Jena, and in 1869, filled the same position in Berlin. He made a number of translations from the Greek, and has written several books on modern history. He d. 1884.

DROZ, ANTOINE GUSTAVE, b. Paris, 1832. He began as a journalist, had extraordinary popular success with a little vol., *Monsieur, Madame, et Bébé*, 1866, and has since published *Entre Nous*, 1867; *Le Cahier Bleu de Mlle. Cibot*, 1868; *Autour d'une Source*, 1869; *Babolain*, 1872; etc. Many of his works have been translated into English. As an exquisite literary workman, an artist in words, he has no superior among cotemporary French writers.

DROZ, FRANÇOIS-XAVIER JOSEPH, 1773-1850; a French writer on morals and politics, who studied law in Paris. In 1799, he published an essay on the art of oratory; some years later, the romance of *Lina*, other essays, works on moral philosophy, on the science of life, and on the application of morals and philosophy to politics and political economy; also on Christianity, and an elaborate history of the reign of Louis XVI. He was a member of the academy.

DRUGGET, a common felt or other coarse woolen fabric, chiefly used for covering carpets, or as a substitute for a carpet.

DRUGS, a name applied to all material agents used in the treatment of disease, when in their crude or commercial forms. See **CHEMISTS** and **DRUGGISTS**.

DRUIDISM. This institution was, perhaps, common to all Celtic nations, but we have detailed accounts only of the form under which it existed in Gaul. Cæsar gives the following description of the character and functions of the Druids: "They attend to divine worship, perform public and private sacrifices, and expound matters of religion. A great number of youths are gathered round them for the sake of education, and they enjoy the highest honor in that nation; for nearly all public and private quarrels come under their jurisdiction; and when any crime has been committed, when a murder has been perpetrated, when a controversy arises about a legacy, or about landmarks, they are the judges too. They fix rewards and punishments; and should any one, whether a private individual or a public man, disobey their decrees, then they exclude him from the sacrifices. This is with them the severest punishment. The persons who are thus laid under interdict are regarded as impious and wicked people; everybody recoils from them, and shuns their society and conversation, lest he should be injured by associating with them. They cannot obtain legal redress when they ask for it, nor are they admitted to any honorable office. All these Druids have one chief, who enjoys the highest authority amongst them. When he dies, he is succeeded by the member of the order who is most prominent amongst the others, if there be any such single individuals; if, however, there are several men equally distinguished, the successor is elected by the Druids. Sometimes they even go to war about this supremacy. At a certain time of the year, the Druids assemble on the territory of the Carnutes, which is believed to be the center of all Gaul, in a sacred place. To that spot are gathered from everywhere all persons that have quarrels, and they abide by their judgments and decrees. It is believed that this institution was invented in Britannia, and thence transplanted into Gaul. Even nowadays, those who wish to become more intimately acquainted with the institution, generally go to Britannia for instruction's sake.

"The Druids take no part in warfare; nor do they pay taxes like the rest of the people; they are exempt from military service, and from all public burdens. Attracted by such rewards, many come to be instructed by their own choice, while others are sent by their parents. They are reported to learn in the school a great number of verses, so that some remain there twenty years. They think it an unhallowed thing to commit their lore to writing, though in the other public and private affairs of life they frequently make use of the Greek alphabet. . . . Beyond all things, they are desirous to inspire a belief that men's souls do not perish, but transmigrate after death from one individual to another; and they hold that people are thereby most strongly urged to bravery, as the fear of death is thus destroyed. Besides, they hold a great many discourses about the stars and their motion, about the size of the world and of various countries, about the nature of things, about the power and might of the immortal gods; and they instruct the youths in these subjects."

It is easy to comprehend that this powerful priesthood did all they could to uphold the national cause against the Roman conquerors, and urged the people to rebellion; so much so, that the emperor Claudius found it necessary to interdict formally the pro-

ting of Druidical rites, which seem, however, to have continued down to the extinction of paganism. Besides being priests and teachers of religion, the Druids appear also to have been adepts in the magic arts, and were versed in the mysterious powers of animals and plants. The oak-tree was especially sacred among the Druids. In oak-groves, they frequently performed their rites, and they even derived their name from this custom. See CELTIC NATIONS. They also had a special reverence for the mistletoe, when growing on an oak. According to Pliny, a Druid, clothed in white, mounted the tree, and with a knife of gold, cut the mistletoe, which was received by another, standing on the ground, in his white robe. The same author gives a curious account of the "serpent's egg," worn as a distinguishing badge by the Druids. It was formed, he says, by the poisonous spittle of a great many serpents twined together. Gathered at moonlight, and afterwards worn in the bosom, it was a mighty talisman. All these particulars refer properly to the Druids of Gaul, but Cæsar's testimony leaves no doubt that the Druidism of Britain was essentially the same.

In all the countries anciently inhabited by Celts, there are found rude structures of stone, one of the most common forms of which is the so-called *dolmen* (see that article). The older archaeologists assumed that these were Druidical altars, but there is no proof that such was their destination or origin: similar structures are found in Scandinavia and many parts of Germany, and to assume in all these countries the presence of Celts, seems too hazardous. The same doubts prevail as to the larger monuments of this kind—the supposed Druidical temples of Amesbury, of Carnac in Brittany, and of Stonehenge (see that article).

DRUIDS, ORDERS OF, various social and benevolent organizations on the masonic plan, widely distributed in England, Australia, and the United States. The first order was formed in London, 1781; the first lodge in New York was organized 1833. In this country, 5 degrees have been added to the entrance degree; degrees have been instituted in England also. There are probably 125,000 members in all the world, of which more than 50,000 are in England, and perhaps 20,000 in the United States. In this country there were, 1870, about 150 "groves," of which number about two thirds were mainly of German membership.

DRUM (*druim*), a Celtic word meaning the back, and applied to a ridge of hills, enters into the composition of many names of places, especially in Ireland, as Drumcondra, Drumglass, Drumsheugh.

DRUM (Gr. *trommel*; Fr. *tambour*—a modification of *tabour*; *timbrel* and *tambourine* are other forms of the word *tabour* or *tambour*), a hollow cylinder of wood or metal, having skin (parchment) stretched across one or both ends, upon which the drummer beats with an instrument of wood or metal called a *drumstick*. The drum is used as an instrument of music along with other instruments in bands, and particularly for military purposes. The military drum serves for giving various signals as well as for music. There are three kinds of drum—the *side* drum, the *big* or *base* drum, and the *kettle* drum. Since 1858, the British infantry are supplied with brass side drums, 3 lbs. lighter than those formerly in use, and tuned with screws instead of straps and ropes. The cavalry drum is a copper or brass hemisphere, thus resembling a *kettle*, with a parchment lid. The big drum has both ends covered with parchment. The ancient Romans used small *hand-drums*—some resembling *tambourines*, others *kettle-drums*—in their religious dances; and the Parthians are said to have used them in war to give signals.

DRUM, a name given to a fashionable and crowded evening-party about the middle of the 18th c., at which card-playing appears to have been the chief attraction. The names drum, rout, and hurricane, by which these gay assemblies were known, sufficiently indicate their noisy, promiscuous, and irrational character. Lady Mary Wortley Montagu, writing from Louvère to her daughter in 1753, hints that ladies gave these entertainments to make money at cards to support their extravagance; and adds: "I find I should be as solitary in London as I am here, it being impossible to live in a *drum*, which, I think, so far from a cure of uneasiness, that it is, in my opinion, adding one more to the heap." See ROUT.

DRUMCLOG is a tract of moorland in Lanarkshire, Scotland. It is famous in history as the place where two hundred Cameronians defeated Claverhouse (q.v.) on June 11, 1679. A monument has been erected on the spot. For a graphic account of this battle the reader is referred to Scott's *Old Mortality*.

DRUM, RICHARD COULTER, b. Penn. in 1825; entered the U. S. army, 1846; served in the Mexican and civil wars; was promoted through various grades to colonel and asst. adjt.-gen., 1869; was appointed adjutant-general and brigadier-general of the army, 1880; and was retired, 1889.

DRUM, SACRED, an object of religious veneration and instrument of magical incantation among the Laplanders in former times. It was hollowed out of a piece of the trunk of a pine or birch, in which certain peculiarities were required, and was covered with skin on the upper side only, the wood being partly left on the under side to serve as a handle. Figures were painted in red on the skin; the drumstick was a reindeer's horn; and to the drum were appended a large copper ring and some smaller rings. The drum was considered a necessary part of the furniture of every family. The motions

of the rings, when the drum was beaten, which might be done only by the head of the family, were supposed to afford indications concerning the results of disease and other future events. The beating of the drum was accompanied with songs, and the person by whom it was beaten often fell into a trance, during which revelations were supposed to be made to him. The sacred drum seems to have been somehow connected with the worship of the sun.

DRUM-FISH, *Pogonias chromis*, of the family SCIENIDÆ, a fish allied to the *sheep's-head*, and inhabiting the shores of the United States, from New York to Florida, in schools. They vary from 2 to 4 ft. in length, and 15 to 18 in. in breadth, weighing from 10 to 25 lbs. Sometimes they are larger, weighing as much as 80 lbs. Scales large, stout, oblique; teeth on the jaws in a band. Pharyngeals with large paved teeth. Tongue broad, short, smooth; branchial rays, seven; dorsal fin has 10 stout, flattened rays, capable of being concealed in a furrow. Second dorsal fin rises at the termination of the first; pectoral fins large and pointed; air-bladder large and thick coated; spleen very long; stomach thick and muscular, with strong muscular columns; vertebræ, 24; color, bronze to red, rather lighter beneath, with a blackish spot behind the pectoral. There are two varieties according to De Kay, one dark brown, the *black drum* of the fishermen, the other the *red drum*. They are coarse food, but the young are regarded as a delicacy. The fish of this genus are remarkable on account of the noise which they make under water, which resembles that of a distant drum, and there is a difference of opinion as to the cause. Cuvier thought it had some connection with the air-bladder; De Kay attributes it to the compressing together of the broad pharyngeal teeth, and so do most of the fishermen, but they also believe that the trituration of the shell-fish upon which they feed is the more immediate cause of the sound. They afford good sport; the line should be baited with soft clams or muscles, with the shell left on. Another species of *D.* is described and figured by DeKay, the *pogonias fasciatus*, much smaller, from 7 to 10 in. long, having four or five blackish vertical bands extending down the sides; the pectoral fins are a faint yellow, the others dark brown. This has been supposed to be the young of the *P. chromis*, but DeKay has seen them 6 in. long in Sept., having all the characteristics of the adult fish. Its teeth and jaws, as well as stomach, resemble those of the larger fish. It has various names, as *young drum*, *grunter*.

DRUM-HEAD COURT MARTIAL. See COURTS-MARTIAL.

DRUM-MAJOR, in the U. S. army, the leader of the drum-corps of a regiment. He has command over the drummers and fifers, instructs them in their duties, and directs their movements while on parade. He ranks as a sergeant, and is attached to the non-commissioned staff.

DRUMMER. In the U. S. army every company of infantry has one fifer and one drummer. They rank as privates, and their duties are to execute signals, perform at parades, drills, and reviews, and to attend the wounded on the battlefield. Drummers are usually boys, and often the sons of soldiers. With the fifers they collectively constitute the regimental field music or drum-corps.

DRUMMER. See COMMERCIAL TRAVELERS.

DRUMMOND, a co. in the province of Quebec, Canada, intersected by St. Francis river; 600 sq. m. Chief town, Drummondville East. Pop. '91, 21,983.

DRUMMOND, Sir GEORGE GORDON, 1771-1854; b. Quebec; entered the British army, 1789; served in Holland and Egypt, and was made lieut.-gen., 1811. He was second in command under sir George Prevost, 1813; planned the capture of Fort Niagara in that year, defeated the Americans at Fort Oswego, 1814, May, and was in chief command of the British forces at the battle of Lundy's Lane in June. In August, however, he sustained a severe repulse at Fort Erie. He was appointed gov. gen. of Canada, 1815, but returned to England, 1816, and resided in London until his death.

DRUMMOND, HENRY, LL.D., lecturer and author, was b. at Stirling, Scotland, in 1851; was educated at the university of Edinburgh, passed through the Free Church Divinity Hall, and was appointed to a mission chapel in Malta, returning to Scotland to become a lecturer in the Free Church college, Glasgow. He lectured in Australia and in the United States, and twice visited Africa. He was an attractive preacher and a most stimulating writer. Among his works are *Natural Law in the Spiritual World* (1883); *The Greatest Thing in the World* (1890); *Pax Vobiscum* (1890); *Tropical Africa* (4th ed. 1891); *The Changed Life* (1891); *The City without a Church* (1893); *The Ascent of Man* (1894), etc. He d. in 1897.

DRUMMOND, Captain THOMAS, R.E., was born at Edinburgh in 1797, and during his professional training at Woolwich and Chatham displayed high mathematical and mechanical abilities, with much aptitude for the application of scientific principles to practical affairs. In 1820, he was engaged by col. Colby to assist in the trigonometrical survey of the United Kingdom. The incandescence of lime having been brought under his notice at a lecture on chemistry, the idea occurred to him that it might be advantageously used on the survey to render distant objects visible: he accordingly made experiments, which, with their results, and the first application of the Drummond light (q.v.) in Ireland, are described by him in the *Philosophical Transactions* for 1826. A heliostat

(q.v.) of his invention, described in the same paper, has ever since been employed with success in the survey. Experiments which he made with the view of adapting his "*Light*" to light-houses, are detailed in the *Philosophical Transactions* for 1830. When exhibited at Purfleet, it was powerful enough to cast shadows at Blackwall, distant 10 miles. Practical difficulties, not yet overcome, prevented the fulfillment of his hopes in this direction; his attention having been diverted to political life, for which he soon proved himself to be eminently fit. As the head of a commission appointed by lord Grey's government to superintend the fixing of the boundaries of the boroughs under the provisions of the reform bill, he performed most ably that laborious and important work. He next acted as private secretary to lord Althorp, chancellor of the exchequer; and finally, in 1835, went to Dublin with lord Mulgrave, as under-secretary for Ireland. Here the knowledge of Irish character and feelings which he had acquired in the survey was of great advantage to him, and by his impartiality, sound judgment, conciliatory disposition, indefatigable energy, and hearty devotion to the work before him, he at once gained the confidence and affection of the people. He died in 1840.

DRUMMOND, WILLIAM, OF HAWTHORNDEN, a poet of considerable celebrity, was descended from a very ancient and noble Scottish family, and was b. 13th Dec., 1585. He was educated at the high school of Edinburgh, and afterwards at the university of that city, where he took his degree of M.A., July 27, 1605. On leaving college, he was sent to the continent in order to study law, for which he exhibited great aptitude. He returned in 1609, and his father dying in the following year, he retired to the paternal estate at Hawthornden, which, according to the learned Ruddiman, "was a sweet and solitary seat, and very fit and proper for the muses;" and there, with an interval of 8 years of foreign travel, spent his life in his favorite literary pursuits. He died 4th Dec., 1649; his death, it is said, being hastened by his excessive grief for the fate of Charles I. His principal works are the following: *Tears on the Death of Mœliades*—prince Henry, son of James I.—(Edin. 1613); *Poems: Amorous, Funerall, Divine, Pastorall, in Sonnets, Songs, Sextains, Madrigals* (1616); *Forth Feasting* (1617); *Polemo Middinia* (Oxford, 1691). After relinquishing poetry, he wrote a sectional history of Scotland, known as the *History of the Five Jameses*. A standard edition of his poems was edited for the Maitland club by Dr. Irving and lord Dundrennan in 1832. Smaller editions appeared in 1833 and 1856, and an exhaustive life, with an account of his writings, by prof. Masson, in 1873. D. enjoyed the friendship of many of his literary contemporaries, including Drayton and "rare" Ben Jonson, the latter of whom visited him at Hawthornden in 1619. D.'s *Notes of Ben Jonson's Conversations with William Drummond of Hawthornden*, is a characteristic record of the literary spirit of the time.

D.'s verse abounds in the conceits, antitheses, and hyperboles of the period, and gives indication of a mind indulging itself in melancholy. His sonnets are the best specimens of his muse, although even in them one looks in vain for sustained harmony or great originality of thought.

DRUMMOND, Sir WILLIAM, 1760–1828; an English diplomatist, author of a *Review of the Government of Sparta and Athens; Origines, or Remarks on the Origin of Several Empires, States, and Cities*, etc. In 1796 and 1801, he was a member of parliament, and was made diplomatic representative in Naples and Constantinople. In *The Œdipus Judaicus* he undertook to explain some of the Old Testament narratives as being astronomical allegories, for which he was very sharply censured.

DRUMMOND ISLAND, belonging to Chippewa co., Mich., is in lake Huron, being the most westerly of the Manitoulin chain. It measures 20 m. by 10, and lies about 30 m. to the e. of Mackinaw an island in the strait of the same name, which pours lake Michigan into lake Huron.

DRUMMOND LIGHT, or LIME-BALL LIGHT. The heat given out during the combustion of a mixture of hydrogen and oxygen gases, or of coal-gas and oxygen, is very intense; and when the mixture is directed on an infusible substance such as lime, a most brilliant light is evolved. Capt. Drummond, R.E., originally proposed the employment of this light in the trigonometrical survey of Great Britain, and constructed apparatus for its production. See **DRUMMOND, THOMAS**. In the most convenient form of the apparatus the mixed gases escaping by a jet, being set fire to and made to impinge upon a cylinder of lime, raise the surface of the latter nearest the jet to a white heat, accompanied by a dazzling light. As minute portions of lime become detached and are volatilized from the spot on the lime on which the jet of burning gases strikes, it is necessary to expose a new surface of lime to the gases, and for this purpose a screw may be turned by the hand or by clockwork. The hydrogen and oxygen ought to be confined in separate gas-holders or bags, and to be brought by different tubes, provided with separate stop-cocks, to within a short distance of the exit jet. The common tube through which the mingled gases pass to the jet is about 6 in. long by two thirds of an inch in diameter; and in Mr. Hemming's construction the tube is very closely packed, full of very fine brass wire, which is afterwards wedged in by a stout wire being driven down the center. The object of the fine wires is to prevent the return of the flame, which might lead to a disastrous explosion. When the rays from this light are concentrated by a parabolic reflector, it can be seen at immense distances. Thus, on the 31st Dec., 1845, at half-past 3 P.M. (daylight), the light was exhibited on the top of Slieve

Donard, in county Down, and was seen from the top of Snowdon, a distance of 108 m.; and in other instances the D. L. has been seen at distances up to 112 miles. The employment of coal-gas instead of hydrogen has greatly increased the applications of the D. L., and it is now often used in magic-lanterns and other apparatus where great brilliancy and penetration of light are required. It has been used lately on the continent with great effect in illuminations. Great caution should at all times be exercised in the preparation, storing, and employment of the gases, as many dangerous explosions have occurred. Little heat is evolved from the D. L., nor does it vitiate the surrounding air, or consume its oxygen.

DRUNKENNESS. See INTOXICATION, and also TEMPERANCE: DIPSOMANIA.

DRUPACEÆ, a species of plants, placed by many as a sub-order of *rosaceæ*, having a one-celled, one-seeded indehiscent fruit, consisting of a fleshy, succulent exterior, and hard stone in center containing seed, such as the peach, plum, and cherry.

DRUPE, in botany, a succulent fruit containing a single seed or kernel, usually inclosed in a hard "stone," the *endocarp*. The succulent part is the *mesocarp*. Examples are familiar in the fruits generally known as stone-fruits, the peach, plum, cherry, etc. In the almond, the mesocarp is not succulent, yet the fruit otherwise possessing all the characters of a D., receives that name. It may be regarded as intermediate between a D. and a nut. The fruits of the genus *rubus* (raspberry, bramble) are composed of many small aggregated drupes, upon a common receptacle. The date is a D. in which the hard "stone" is represented by a membrane.

DRURY, DRU, a goldsmith, silversmith, and cutler, in London, where he was b., 4th Feb., 1725, was devoted to the study of entomology and the collection of exotic insects. His *Illustrations of Exotic Entomology* (2 vols., Lond. 1773-82), a work unrivaled at the time of its publication for the accuracy and beauty of its figures, is still in high repute as a book of reference. D. was also assiduous in his endeavors to acquire information concerning the habits of insects. He died 15th Dec., 1803.

DRUSES, a remarkable people who inhabit a district in the n. of Syria, comprising the whole of the southern range of Mt. Lebanon and the western slope of Anti-Lebanon. In this district they hold exclusive possession of about 40 towns and villages, and divide the possession of about 200 more with the Maronites (q.v.), while 80 villages in other parts of Anti-Lebanon are peopled by them. The inhabitants of the Lebanon afford a remarkable illustration of the amalgamation of races. After the second captivity of Israel, Esarhaddon re-peopled the wasted strongholds of Samaria with certain fierce tribes, some of whom, called in the Scriptures Cuthites, and known in subsequent times to the Greeks as Carduchi, and familiar to us as Kurds, settled in Lebanon. From them the present D. are supposed to have originally sprung. More than a thousand years later, a fresh colonization took place. The Mardi, a warlike tribe who dwelt to the n. of the Caspian, originally of Persian extraction, were transplanted thither by Constantine IV., in 686 A.D., to the number of 12,000, to act as a bulwark against Mohammedan invasion. The Arabs also, in sweeping through the mountain fastnesses, left a permanent impression there. Thus, Cuthites, Mardi, and Arabs, or rather Mohammedans of various races, have combined to form that strange being—the modern Druse. It has also been supposed by some that there runs in his veins not a little of the blood of the crusaders, but this is doubtful. No immigrations, however, of any importance into the country of the D. took place after the close of the 10th c.; and this period seems naturally to conclude the first great section of Druse history.

The nationality of these mountaineers having now been consolidated, their peculiar and mysterious religion began gradually to be developed. Hakem Biamr Allah, or Bemrillah, caliph of Egypt, and a Nero in cruelty, was the author of this system. He affirmed that he was the representative of God, and, having enlisted his confessor, Darazi, in his cause, he prepared to propound his doctrine. In the 407th year of the hegra (1029 A.D.), the divine nature of Hakem, or rather the incarnation of the spirit of God in him, was publicly announced at Cairo. This revelation, however, was unfavorably received by the mob. Hakem's confessor, Darazi, narrowly escaped the fate of a martyr to the impostures of his master. Retiring, however, to the fastnesses of the Lebanon, he there began to inculcate the principal of the new faith; and although he never acquired any mastery over the sympathies of the mountaineers, he at least left his name to them; for there can be little doubt that the name Druses is derived from that of Darazi. Hamzé, a Persian mystic, and successively the disciple and vizier of Hakem, introduced into the newly promulgated religion all the elements of attraction and strength which it possesses; and him the D. venerate as the actual founder of their faith.

The D. form one of the very few sects among whom proselytism is discouraged. They are remarkable conservatives. For 800 years they have maintained a distinct religious and political independence and nationality. Into their faith the doctrines of the Pentateuch, the Christian gospel, the Koran, and the Sufi allegories, are wonderfully interwoven. They reject, however, the seven points of Islamism, substituting for them the following seven:—1. Veracity (to each other only); 2. Mutual protection and resistance; 3. Renunciation of all other religions; 4. Profession of the unity of Hakem

as God; 5. Contentment with his works; 6. Submission to his will; 7. Separation from those in error, and from demons. They believe in one God in whom there are no parts, to whom they ascribe no attributes, before whom the tongue ceases to utter, the eyes to behold, but who has revealed himself ten times upon the earth under the form and name of mortal men. In Hakem, so Hamzé taught, had God revealed himself for the tenth and last time. They also believe that the number of existing souls never varies, and that all the souls in life now, have lived, vested in some human form, from the beginning of the world, and will so continue to exist till the end of it; that when a man dies, his soul puts on a fresh humanity, which occupies a rank in moral dignity corresponding to the purity or impurity of the past life. But although they believe, in this sense, in the transmigration of souls, they also believe that after the lapse of ages, when the soul will have been purified from every stain, there will come a period of rest. As a religious body, the D. are divided into two classes: the Akals, or those initiated into the Druse mysteries; and the Djahils, the uninitiated. The former do not adorn themselves with gold, or wear silk, embroidered, or fanciful garments; they forbear using wine, spirits, tobacco, and other luxuries, never swear, utter obscene language, or lie. The latter are free from all religious duties. But, however rigid the profession of the Akal or initiated Druse, he is taught that his practice may be conducted in some cases on the principle of expediency. To be truthful, he is taught, is desirable; but when concealment is necessary, then equivocation, or even falsehood may be practiced.

Previous to 1840, Druse and Maronite lived on terms of intimacy and friendship. At that period, however, dissension sprang up between the two tribes, and proved to be the introduction to years of intermittent warfare. The strife reached its climax in 1860. From May to Oct. of that year, accounts of the fearful barbarities practiced by the D. upon the Maronites followed each other with appalling frequency, until the indignation of Europe was roused against them. A conference of the five powers which had guaranteed the independence of Turkey met at Paris, and it was resolved that a French army should proceed to Syria to chastise the D., and that, at the same time, a European commission should, on the spot, make inquiry as to the facts. The troops reached Syria in Aug., 1860. They could not, however, get at the D., who retired into the desert of the Haouran. In the meanwhile, it was ascertained beyond all doubt that the Turks, and the low fanatical mob of Damascus (who have frequently been confounded with the D., because they fomented their passions), were mainly chargeable with the crimes that had been committed; and that the retaliation of the Maronites was equally vindictive and horrible. It is stated that the Maronite leaders—in most cases bishops—on being asked to furnish sworn lists of such of the D. as, from the unusual atrocity of their crimes, were worthy of death, sent in a list demanding 4,946 heads; refusing, however, to bring forward any particular charges. Punishment was inflicted on those who were really to blame. While the French troops remained in Syria, the Turks were compelled to punish the chief Mohammedan criminals, a considerable number of whom, including Achmet Pasha, the governor of Damascus, were shot. In June, 1861, the troops returned to France, and the commissioners drew up a new constitution for the Lebanon, finally revised and signed on 6th Sept., 1864. Under it, the Lebanon is to be ruled by a Christian governor, appointed by the porte; and to be divided into seven districts, under chiefs of the prevalent religion in each. The result was the appointment, as governor, of Daoud Pasha, an Armenian Christian, and of 7 chiefs (4 Maronite, 1 Druse, 1 orthodox Greek, and 1 separatist Greek). The constitution did not satisfy the Maronites, whose revolt, under Joseph Karam, kept the Lebanon in a very unsettled state till 1867. During this period, the governor had to restrain the D. from attacking the Maronite villages in the absence of their defenders. The D. are about 80,000 in number; they are a brave, handsome, and industrious people, and can almost all read and write. They had no superior educational establishment until Daoud Pasha founded and endowed one at Abey. Polygamy is unknown among them. They have, with incredible toil, carried the soil of the valleys up and along the hillsides, which are laid out in terraces, planted with mulberry, olive, and vine. Their chief trade is the manufacture of silk. Corn is also raised, though in very small quantity. Deir-el-Kammar is the principal town. See *Druses of the Lebanon*, by the earl of Carnarvon; Guy's *La Nation Druse*, and Laurence Oliphant's *Haifa* (1887).

DRUSIUS, OR VAN DEN DRIESCHE, JOHANNES, 1550-1616; a native of Flanders, an orientalist, and Protestant divine. He went to England when young, and became professor of oriental languages at Oxford. In 1576, he returned to his own country, and was given the same professorship in Leyden. He was subsequently professor of Hebrew in the university of Franeker, in Friesland. He had a son John who mastered Hebrew before he was nine years old.

DRUSUS, the name of a distinguished family of the gens Livia, which contributed a large proportion of eminent men to the Roman commonwealth. The most conspicuous of the Drusi were: 1. M. LIVIUS DRUSUS, tribune of the people in 122 B.C., who made it the business of his public life to thwart the democratic policy of his colleague, C. Gracchus, and uphold the cause of the senate and nobles, which he did with much skill and ultimate success. 2. His son, who bore the same name as himself, and whose

dangerous and daring political intrigues, conducted partly for the benefit of the aristocratic party whose sympathies he inherited, and not less for his own aggrandizement, kept Rome in perpetual turmoil and disorder from 100 B.C. till his death in 91 B.C. Though identified by birth and sympathy with the patricians, Drusus, to win the people, renewed some of the most liberal measures of the Gracchi, and carried agrarian and frumentarian laws. During the latter years of his life, he contrived to gather into his own hands the threads of the various political movements which resulted in the social war; but his almost incredible pride and arrogance had made him so many enemies, that his death, in the flower of his age, was regretted as little by his friends as by his foes. 3. The most illustrious of the Drusi was Nero Claudius Drusus, commonly called Drusus senior, the stepson of the emperor Augustus, and younger brother of the emperor Tiberius. He was born in 38 B.C., and as he grew up, developed splendid personal qualities as well as the highest capacity for civil and military affairs. He began his public career in 19 B.C., and signalized himself when only 23 years old by his defeat of the Rheti and other Alpine tribes which infested the n. of Italy. In 13 B.C., he was sent into Gaul, then in revolt, and, after crushing the rebels there, pushed across the Rhine in pursuit of their German allies. In this campaign he subdued the Sicambri and Frisii, and forced his way to the German ocean, being the first Roman general who had done so. From this time he made the business of his life to establish the Roman supremacy in Germany, partly by conquest, and partly by the execution of great military works. Among these latter may be mentioned the canal joining the Rhine with the Yssel, the two bridges over the Rhine itself, and the embankments of the Vahalis, the Waal. In 11 B.C., he conquered the Usipetes, the Cherusci, and the Suevi; in the following year, the Chatti, the Nervii, and was prosecuting the work of subjugation in 9 B.C., when a fall from his horse cut short his brilliant career in his 30th year. For his exploits in Germany, D. was rewarded with the title of Germanicus, but care must be taken not to confound him with the celebrated Germanicus, his own son. See GERMANICUS.

DRUSUS CÆSAR, usually called Drusus junior, d. 23 A.D.; and son of Tiberius by his first wife. He was made quaestor in 10 A.D., consul in 15 A.D., but degraded the office by his excesses, and his father sent him with the army to Illyria. In 22 A.D., he was made *tribunicia potestas*, and looked upon as heir to the throne. Deeming Sejanus to be his rival, Drusus struck him in the face; whereupon Sejanus persuaded Livia, the wife of Drusus, whose affections Sejanus had beguiled, to poison him.

DRUSUTHURM, THE, is the name of the principal tower of an old ruined castle near Bingen, Germany. The castle was built by Drusus, and is located on the Rochusberg. It was known during the Middle Ages as the Klopp castle.

DRY ADS, an inferior order of deities in the mythology of Greece. Their name is derived from the Greek word for an oak-tree (*drus*). They were looked upon as the guardians of the larger kinds of forest trees, along with which they came into being, and with which they died.

DRYDEN, a tp. of Tompkins co., N. Y.; including Dryden vill., Etna, and Freeville; situated on the Auburn branch of the Reading system. It has a large woolen factory, a tannery, and sulphur springs; a resort for invalids. Pop. '90, 4043.

DRYDEN, JOHN, was b. at Aldwinckle, in Northamptonshire, on the 9th Aug., 1631. His father, Erasmus Driden, was the third son of sir Erasmus Driden, created a baronet in 1619. D. received the rudiments of his education at Tichmarsh, and was afterwards admitted a king's scholar at Westminster school, under Dr. Busby. Here in 1649, he wrote an *Elegy on the Death of Lord Hastings*, and some commendatory verses on the *Divine Epigrams* of his friend John Hoddgesdon; both of which performances were published in 1650. In May, 1650, he was elected to a scholarship in Trinity college, Cambridge; he took the degree of Bachelor of Arts in 1653-54; and was made Master of Arts in 1657. His father dying in 1654, put him in possession of an estate worth £60 per annum, of which sum his mother had life-interest in a third. After leaving the university, he proceeded to London, under the patronage of sir Gilbert Pickering, who was faithful to the protector, and seems to have aroused for the time the same feeling in his protégé, whose first poem of importance was entitled *Heroic Stanzas on the Death of Cromwell*. On the return of Charles II., D., with equal splendor of diction, and perhaps with equal sincerity, congratulated the restoration.

The publication of a poem, entitled *Astræa Redux*, led to a breach between the poet and the family of sir Gilbert Pickering, and he now became author by profession. He turned his attention to the stage, planned *The Duke of Guise*, and wrote his first acted play, *The Wild Gallant*. In Dec., 1663, he married a daughter of the first earl of Berkshire, with whom he received a portion; and in 1670, he was appointed poet-laureate and historiographer, with a salary of £200 a year. He afterwards entered into an engagement with the theaters to supply them with three plays each year, for which he was to receive annually from £300 to £400; but as he did not fulfill his share of the contract, it is not probable that the theaters fulfilled theirs. In 1671, the duke of Buckingham produced his attack on the English heroic drama, of which D. was the head. This satirical piece was entitled *The Rehearsal*, and when it was brought on the stage, the town was amused. Although personally satirized, D. endured his castigation in silence, and, waiting his opportunity, immortally revenged himself on the witty and prodigate

duke in the *Absalom and Achitophel*. This magnificent satire arose out of the political commotions of the times, and is an elaborate defense of the king against the whig party. Charles II. is *David*; Monmouth, *Absalom*; Cromwell, *Saul*; Buckingham, *Zimri*; and Shaftesbury, *Achitophel*. Its success was amazing; it ran through five editions within the year. This great poem appeared in 1681; and enraged at its success, D.'s enemies hovered around him like a cloud of venomous gnats. In the same year he published *The Medal*. Elkanah Settle, one of the most virulent of his foes, replied with some effect; and D., thoroughly roused, issued next year the *Mac Flecknoe*, and the second part of *Absalom and Achitophel*. These satires were as overwhelming as the Italian battles of the first Napoleon; D.'s enemies were crushed forever, and he remained during his lifetime the undisputed king and lawgiver of English literature.

After the death of Charles II., D. became a convert to the Roman Catholic faith. This event was announced to the world by the publication of *The Hind and Panther*, in 1657. For this change of faith, he has been much abused. Macaulay calls him "an illustrious renegade." Mr. Bell, one of his biographers, strenuously defends his conscientiousness. At the revolution, he was deprived of his laureateship, and somewhat straitened in circumstances, he fell back upon his old occupation of writing for the stage. His translation of *Virgil* was begun in 1694, and completed by the close of 1696. A month after the publication of *Virgil*, appeared the *Ode on Alexander's Feast*. In 1698, he commenced his *Fables*, and completed them in a year and a half. His last work was a mask, with prologue and epilogue. He died on the 1st May, 1700, and was buried in Westminster abbey, where a monument was erected to his memory by John, duke of Buckingham.

Although the great bulk of D.'s works are composed of plays, and although these are, for the most part, devoid of character, feeble in sentiment, false to all external nature, and exaggerated in expression, he remains one of the prime glories of English literature. His *Satires* and his *Fables* are masterpieces. In these, he is almost always masculine and natural, and his versification flows on broad, deep, and majestic. Nor is it only as a poet that he excels; his prefaces and *Essays on Dramatic Poesy* prove him to be a master of "that other harmony of prose." His works in 18 vols. were edited by Scott.

DRYING-MACHINES. The ordinary process of drying clothes and fabrics by exposure in the open air, has been found too tedious for the bleacher, dyer, and for large laundry establishments; and hot-air chambers have been extensively used; but a great improvement has been lately made by using the principle of centrifugal force to throw off the greater part of the moisture. The drying-machine commonly used consists of two drums or cylinders open at the top, the inner one, into which the goods are packed, is perforated at its sides, and made to revolve with great velocity either by steam, water, or hand-power. The action of the drying-machine is precisely the same in principle as that witnessed when the housemaid is *trundling* a mop, or of the dog when he shakes himself on coming out of the water. The use of the outer cylinder is merely to catch the drops of water thrown out, and prevent the inconvenience that would result from its distribution through the apartment. A pipe connected with this outer drum carries the water away. The drying is not, however, quite completed by such machines; a very slight degree of moisture, just perceptible to the touch if the goods are pressed against the cheek, still remains. This is expelled by open-air or hot-chamber drying. These drying-machines are commonly called "extractors" by dyers. A simpler and cheaper drying-machine has been lately introduced for domestic use. It consists of two rollers mounted parallel, and one above the other, with an adjustment to vary the distances between them. One end of the article to be dried is inserted between the rollers, which are then brought as close as possible together, and one roller is turned by a handle, the other, being free to revolve, turns also as the clothes pass between them—the moisture in this case being extracted by pressure, as in the common process of "wringing."

DRYING OILS. See OILS.

DRYNESS, a technical term in painting, used to indicate a style in which the drawing is hard, angular, and formal, and the color deficient in harmony and mellowness, though not necessarily in power or richness. The earlier works, both of the Italian and Flemish schools, all more or less partake of this defect; and it is the most prominent characteristic of those of their imitators to whom the name of pre-Raphaelites has been given.

DRY'OPHIS, a genus of serpents of the family *colubridæ*, allied to *dendrophis*, and, like those of that genus, of very elongated form, and living mostly among the branches of trees, but distinguished by a projecting muzzle—a curious prolongation of the upper jaw, which in some is slender, in some leaf-like. They are natives of the East Indies.

DRY PILE is a voltaic pile or battery consisting of numerous sheets of paper covered with zinc foil on one side and black oxide of manganese on the other. Various modifications of the above form are also known by the same name. Following the invention of Volta, Behrens constructed a pile in which paper was used instead of moistened cloth, in consequence of which it was called a dry pile. The term dry pile is really a misnomer, as the pile is inactive unless the paper contains a certain amount of moisture. Behrens's construction was modified and improved by Zamboni, who gave it the name of Zamboni's pile. This was made of so-called gold and silver paper, the former being

coated on one side with copper foil and the latter with tin. The couples were made of small discs of the coated paper placed together with their metallic sides outwards and these were piled up to the number of a thousand or more, with the copper of every pair facing in the same direction. The entire pile was then firmly pressed into a glass tube, varnished with shellac, and finally covered on the ends with brass caps. These were made with as many as 20,000 pairs of discs and were capable of charging a thin Leyden jar of 350 sq. cm. surface in ten minutes to such an extent that its discharge melted 2.5 cm. of platinum wire of .05 mm. diameter.

The dry pile has been employed by Bohnenberger in the construction of a very delicate gold-leaf electroscope. For this purpose the dry pile was constructed in two columns connected together below, so that the poles were at the upper ends. Between these poles a single gold leaf was suspended. If the connection between the lower ends be connected to earth, one pole will always be positive and the other negative. A very slight charge given to the gold leaf is sufficient to make it move to the positive or negative pole of the dry pile. The dry pile has also been applied to the construction of a perpetual motion electric pendulum. The dry pile is divided into two columns, in the same way as in the electroscope just described, and between them a very light pendulum rod is set on knife edges which are placed very close to the centre of gravity of the rod. On the upper end of the rod is a light metal ring which oscillates between the two poles. The pendulum inclines first to one side and the ring touches one pole by which it is charged. This repels the pendulum and carries it to the opposite pole where the charge is neutralized and it receives a charge of the opposite polarity which reverses its motion. This action is repeated indefinitely.

Such a pendulum has been in continuous motion in the University of Innsbruck since 1823. The period of its oscillation varies slightly with the humidity of the atmosphere. The energy expended is exceedingly minute, as no pile can generate a sensible current except by a corresponding consumption of its materials in the shape of chemical action.

DRY-POINT, a sharp etching-needle, used to incise fine lines in copper, without the plate being covered with etching-ground, or the lines bit in by acid. See **ENGRAVING**. The work produced by the dry-point is not only very delicate, but it wears less in printing than lines produced by the action of acid. Fairholt's *Dictionary of Art Terms*.

DRY PROCESS. See **PHOTOGRAPHY**.

DRY ROT, a kind of decay, often very rapid, to which timber is subject, without the presence of much moisture. It has proved ruinous to many valuable edifices, and has been the cause of many serious accidents. The ends of joists are often affected by it, so that upon being burdened with even a slight additional load, they are ready to break off by the wall; and the process of destruction has often gone far without a suspicion being entertained of anything wrong. Dry rot is occasioned by *fungi*, the *mycelium* of which diffuses itself through the substance of the timber, destroying its texture, and reducing it to a fragile or even friable mass. *Merulius lacrymans*, *M. vastator*, and *polyporus destructor* (see **AMADOU**), are species very commonly productive of this mischief; the first being the most common and formidable dry-rot fungus in Britain, and the last having the same pre-eminence in Germany. Its German name is *haussehimm*. Other fungi, however, produce the same effects where none of these are present; but besides the species which are well ascertained, there are some forms of mycelium not unfrequently occurring as dry rot, of which it is uncertain to what fungus they ought to be referred, as they have not been observed to develop themselves in any perfect form, whilst also it is not known what different modifications of appearance the mycelium of the same fungus may exhibit in different circumstances. Very destructive ravages have been ascribed to different species of *sporotrichum*, particularly in the naval yards of Britain; but the genus is altogether a doubtful one, and not improbably consists of mere forms of undeveloped mycelium. Several species of fungi are often present together in timber affected with dry rot. Some of them penetrate deeply into the substance of the timber, others spread more superficially, but attract moisture from the atmosphere, which hastens decay. This is the case with *merulius lacrymans*, which first appears in small white points; a filamentous substance, radiating from these, gradually forms broad patches, sometimes many feet in diameter; from these, long creeping shoots often proceed, and a net-work of filaments penetrates into every crevice. The species of *polyporus* more generally fill the whole mass of the timber with delicate filaments, which destroy the cohesion of its fibers. *Dedalea quercina* appears in the form of leathery laminae, often in the strongest oak, and the delicate threads of mycelium penetrate every duct and cavity, reducing the whole to a fungous mass. Beautiful orange tufts sometimes appear, supposed to be the mycelium of species of *coprinus*.

Of the causes of dry rot, stagnation of air, as behind a wainscot or under a floor, is certainly one of the chief, and a knowledge of it suggests means of prevention which may often be easily and most advantageously employed. Another principal cause is insufficient drying of the timber itself; and much of the prevalence of dry rot is not improbably due to the practice of felling oak in spring for the sake of the bark, when the wood is full of sap. Any circumstance which may tend to render the sap acidulous, greatly increases the liability to dry rot. The production of fungi takes place with unusual rapidity when by fermentation or otherwise an acidulous condition of organic substances is produced. A fermentation and chemical change in the albuminous constituents of the wood, is not improbably the immediate cause of dry rot, providing a soil suitable for the vegetation of fungi.

For the prevention of dry-rot, various processes have recently begun to be employed, the object of which is to fill the pores of the wood with some chemical substance, sir William Burnett used chloride of zinc; Mr. Bethell used creosote; and Mr. Payne, lime, with silicate of potash. The process most generally approved, and apparently most successful, is that of Kyan, called *Kyanizing* (q.v.), in which a solution of corrosive sublimate is introduced into the pores and cells of the timber by means of an air-pump. The salts of mercury have been found to be more unfavorable to the development of fungi than any other chemical substances.—But without the use of any such means, we have abundant evidence that well-seasoned timber, in favorable circumstances, may remain unassailed by fungi for many centuries. England contains structures of which the timber is known to be nearly 1000 years old; wood in a state of perfect preservation was brought by lord Elgin from behind the frieze of the Parthenon, where it must have been placed more than 2,000 years ago; and the British museum contains a block of charred wood found by Layard at Nineveh. See *illus., Mosses, etc.*, vol. X.

DRY STOVE, in gardening, a hot-house in which the air is kept less moist than in the bark stove. In structure and in management, except that the temperature is kept higher, it agrees more nearly with the green-house. The dry stove is particularly adapted to succulent plants. As free admission of air is allowed in the dry stove as is consistent with the maintenance of the temperature.

DRY TORTUGAS, the extreme south-western islets of the Florida Keys in the gulf of Mexico; 120 m. w.s.w. of the s. extremity of the mainland. They are of coral formation, low, and generally barren, though some are covered with mangrove bushes. Fort Jefferson, on one of them, was a penal station during the war of the rebellion. On the same island is a lighthouse. They are included in Monroe co. Florida.

DUAL, in grammar, is the form given in some languages to a noun or a verb, when only two things are spoken of. Thus, in Greek, *pater* is father; *patere*, two fathers; *pateres*, fathers. To have a dual number in addition to a plural is often spoken of as a refinement of language. It argues, however, a higher degree of abstraction to be able to conceive every subject as one, or more than one, than to require three classes—one, a pair, and more. Accordingly, it is only in some of the more ancient languages that we find traces of a dual number, and it becomes lost as the power grows of analyzing concrete impressions. Sanscrit, ancient Greek, Arabic, and Hebrew, have the dual number, the last only in nouns. Modern Greek has lost the dual. The only trace of it in Latin is in the two words *duo*, two, and *ambo*, both. It is wanting in the Germanic languages, with the exception of the ancient Gothic, which had a dual form of the verb. In Anglo-Saxon, there was a separate form of pronoun for "we two" (*wit*) and "ye two" (*git*).

DU'ALIN, an explosive preparation of nitro-glycerine and sawdust, intended to diminish the danger in the transportation and storage of nitro-glycerine.

DUALISM is the name given to a philosophical theory, according to which some two principles, of different nature, original, and incapable of being derived the one from the other, lie at the bottom of everything; as, for example, the ideal and the real, or the material and the thinking substance. In a narrower and theological sense, dualism means the assumption of two original beings, a good and an evil, as in the doctrine of Zoroaster; or of two distinct principles in man, a bodily and a spiritual. The opposite of dualism is monism. See **ZOROASTER**.

DUANE, JAMES, 1793-97, b. N. Y.; a lawyer and a leader in the revolutionary war. He was a member of congress, 1774-77 and 1780-82; was the first mayor of New York after the revolution, and late in life was U. S. district judge.

DUANE, JAMES CHATHAM, an American military engineer, was b. in Schenectady, N. Y., June 30, 1824, graduated at West Point in 1848, where he was assistant instructor until 1854, after which he constructed fortifications for two years, was light-house inspector for two years. He served with distinction in the Civil War, and retired 1888 and became commissioner of Croton aqueduct the same year.

DUANE, WILLIAM, 1760-1835; b. N. Y.; politician and journalist. He began journalism in India about 1784, but was sent back to England because of criticisms on the government, and his large fortune was confiscated. In London, he was for a time editor of the *General Advertiser*. In 1795 he came to Philadelphia, and took the editorial chair of *The Aurora*, the organ of the Jeffersonian democracy, making it one of the most vigorously abusive journals in an abusive age. On one occasion he was mobbed and savagely beaten by a party of federalists. In 1822, he left the editorial chair and traveled in South America, and on return published an account of his wanderings. He served in the war of 1812. He wrote several works on military subjects.

DU BARRY, MARIE JEANNE GOMARD DE VAUBERNIER, Comtesse, favorite of Louis XV., was b. Aug. 19, 1746, at Vaucouleurs. Her mother was a dressmaker, and her father, or rather her reputed father, was an exciseman named Vaubernier. When fifteen years of age she went to Paris, and met there the comte Jean Du Barry, who made her his mistress. This person afterwards introduced her to Lebel, valet-de-chambre of Louis XV., who presented her to his royal master, then nearly 60 years of age. She was at this time remarkably handsome, to some extent witty, and had a frankness or, it might be, a vulgarity of manner that amused the doting monarch.

Desirous that *la petite Lange* should obtain a title, and be introduced to court, Louis prevailed upon comte Guillaume Du Barry, brother of the comte already mentioned, to marry, and thereby confer his title upon, the favorite. Accordingly, in 1769, she was presented to court as the comtesse Du Barry. After this period, many of the most powerful courtiers abased themselves before her. D'Aiguillon became her confidant, and in concert with her, ruled the doting king; the chancellor Maupeou claimed a remote relationship with her, and by her influence succeeded in dismissing and exiling the parliament in 1771; the abbé Terray, comptroller-general of finance, was *suave* to her, though insolent to all the rest of France. At no period, perhaps, was the court of France more openly and outrageously immoral than during the supremacy of this strumpet. On the death of Louis, however, in 1774, Du B. was dismissed from court, and sent to live in a convent near Meaux. She was afterwards removed to her residence of Luciennes, and while living there was allowed a pension by Louis XVI. Some time after the outbreak of the revolution, she went to London to dispose of her jewels. On her return, Robespierre caused her to be arrested, July, 1793. In Nov., she was tried before the revolutionary tribunal, and accused of "having wasted the treasures of the state, of conspiracy against the republic, and of having, in London, worn mourning for the late king." She was condemned to death, and was sent to the guillotine 7th Dec., 1793. Of all the women who mounted the scaffold during the revolution, Du B. exhibited the least courage. She implored the "good people" to deliver her, and Monsieur the executioner to prolong her miserable life for one moment only. The single good thing that history records of her, is her patronage of various artists and men of letters, but there is little reason to believe that it originated in anything higher than her dread of epigram and caricature. She had neither taste nor knowledge, and cared only for sensual gratifications and excitement. It is estimated that she cost France 35,000,000 francs. The *Mémoires* published under her name (6 vols., Par. 1829-30) are not reliable. The only work, it seems, which can be consulted with confidence is Lacretelle's *Histoire de France pendant le 18^{me} Siècle*.

DUBITZA, a fortified t. situated on the northern frontier of Bosnia, on the right bank of the Unna, and at a point about 10 m. from its confluence with the Save, of which it is a tributary. During the 16th and 17th c. it was a bone of contention between Austria and the Porte, and was repeatedly lost and regained by the latter. It is chiefly notable, however, for its heroic but unavailing resistance to the Austrians in 1788. Pop. about 3,000. D. was subsequently restored to the Turks; but became Austrian, 1878. Over against Turkish D., on the opposite bank of the Unna, stands Austrian Dubitza, a strongly fortified market town in Austrian Croatia. Pop. '90, 3,379.

DUBLIN, a maritime co. in the e. of Leinster province, Ireland, and containing the metropolis of that country; bounded, n., by Meath; e., by the Irish sea; s., by Wicklow; and w., by Kildare and Meath. It is the smallest but two of the Irish counties, being 32 m. long and 18 (average 12) broad; area, 354 sq. m. The coast, from its indentations with creeks and bays, is 70 m. long, and off it lie several isles. Dublin bay, one of the finest in the kingdom, is 6 m. broad, 6 deep, with a sweep of 16 miles. Besides this there are the bays of Killiney, Rogerstown, Malahide, and Lough Shinney, and the artificial harbors of Howth, Balbriggan and Kingstown. It has two precipitous hills, about 500 ft. high at its n. and s. ends; but the head of the bay is low and sandy. The coast is defended by 26 martello towers. The surface is mostly a level rich plain, with slight undulations, but rising in the s. in a hill-range, the highest point of which is Kippure, 2,473 feet. N. of this range, the only prominent eminences are Lambay isle, or Ireland's Eye, and Howth Head, 503 feet. The only river of note is the Liffey, which runs through Dublin city into Dublin bay. The Royal and Grand canals run w. through the co., and unite the Liffey and the Shannon. The chief rocks are carboniferous limestone, granite, and some metamorphic rocks and greenstone. There are copper and lead mines near Scalp. Fuller's-earth and potter's-clay occur. Iron and manganese are found on Howth peninsula. Granite and limestone are much used in building. There are many mineral springs, including 10 saline purgative ones, within the city of Dublin, and some tepid ones of 75° F. The climate is mild. The soil is generally a shallow calcareous gravelly clay. In the n. and w. are grazing and meadow farms, and around Dublin city, villas, kitchen-gardens, dairies, and nurseries. The county contains three cromlechs, one to the south of Killiney, one at Howth, and one at Brennanstown. There are also some ancient round towers, and at St. Dawlagh's is a curious church with a stone roof. D. is the best cultivated co. in Ireland. The chief crops are oats, wheat, potatoes. There are important fisheries, along the coast, of turbot, brill, sole, plaice, cod, ling, haddock, whiting, and oysters. The manufactures (chiefly of cottons, stockings, and embroidered muslins) are mostly confined to the city and the vicinity of the metropolis, and are of more value than in any other Irish county. Balbriggan is famed for its hosiery. The chief exports are from Dublin city. The chief towns are Dublin, the capital of Ireland, and Kingstown. The co. sends eight members to parliament—two for D. co., four for Dublin city, and two for Dublin university. The manners, appearance, dress, and cabins of the lower orders in D. co. differ less from those of the interior of Ireland than would be expected. There are numerous antiquities in different parts of the county. Pop. 1891, 429,216.

DUBLIN (Irish, *Dubh-linn*, "black pool;" the *Eblana* of Ptolemy), the capital of Ireland, stands on the river Liffey, where it disembogues into Dublin bay, in lat. 53° 20' 38" n., and long. 6° 17' 30" west. It covers an area of 1300 acres, but its parliamentary boundary comprises an area of about 5,000 acres, and its municipal boundary nearly 4,000 acres. Much of D. is built on land reclaimed from the sea, a work which still continues; and the ground is generally flat, with a very few undulations, scarce deserving the name of hill. The river, running from w. to e., divides the city into two almost equal portions. The aristocratic parts are the s.e. and n.e., containing many beautiful squares, with splendid streets and terraces. The center, and the n.w. quarter are the great emporiums of trade, and the residence of the middle classes, many of whom, however, have their private houses in the suburbs. The s.w. division, part of which is called the "Liberties," once the seat of the silk trade, is the most filthy and degraded portion of the city. The streets in this quarter are narrow, crooked, and irregular, while in the fashionable portions they possess a totally opposite character. The city is surrounded by a "circular road" of nearly 9 m. in length, forming a favorite drive and promenade.

In the newer parts of D., the streets run at right angles to one another, and are remarkable for their breadth and the uniformity of their architecture, which, however, is so varied as to avoid monotony. The most imposing one is Sackville street, which is 120 ft. broad, and nearly 700 yards long; at its n. end stands the rotunda, with Rutland square—in its center, the beautiful Ionic portico of the general post-office, and Nelson's monument (upwards of 130 ft. high)—while on the s., it is terminated by Carlisle bridge, and a wedge-like block of noble houses formed by the converging sides of Westmoreland and D'Olier streets. A peculiar feature of D. is its squares, which are very numerous, spacious, and well kept. Stephen's Green is about a mile in circuit. Somewhat smaller, but more elegant and aristocratic, is Merrion Square (13 acres). The large park and squares of Trinity College occupy more than 40 acres. An electric street railway was opened in 1896.

The public buildings of D. are famed for their number and grandeur, and appear to more advantage since the dwelling-houses are built of brick. In the first class may be mentioned the bank of Ireland (formerly the house of parliament), Trinity college, the custom-house, and the four courts, which, from the chasteness of their design, and the massiveness of their proportions, have a very imposing effect. The castle has no pretensions to architectural beauty. There are monuments of William III. in College Green (once a *green*, but now a paved street); of Nelson, the duke of Wellington, Goldsmith, Burke, Grattan, and many others in various public sites. The benevolent and charitable institutions of D. are very numerous, and are liberally supported.

Within the limits of the circular road, the Liffey is crossed by several stone and iron bridges, and throughout the whole extent of the city the banks of the river are faced with granite walls and parapets. On each side of these "quays" there is a spacious roadway, with tall houses and excellent shops. The quay proper extends eastward from Carlisle bridge. Near the custom-house, there are several large docks for the accommodation of vessels from distant ports with excisable cargoes, and in communication with the Royal and Grand canals; the former connecting Dublin with the North Shannon and the w. of Ireland, the latter with the s. portion of the same river and the south. A very spacious dock, the "Spencer dock," was opened in 1873; and the harbor has been much improved in late years by the completion of two large breakwaters, the n. and s. walls. There is a bar at the mouth of the harbor, but even there the least depth at low tide is about 11 feet.

The chief manufacture of D. is poplin, which is much celebrated. This, with some glass-works, cotton and linen factories, foundries, distilleries, breweries, and those workshops which are necessary to supply domestic wants, are the main branches of industry. In this regard, D. has been much more of a capital, and less of a manufacturing and export city than London; but a considerable change in the industrial character of the city has been going on for several years. The direct foreign trade, though increasing, is very limited, Glasgow, Liverpool, and Bristol intercepting the greater portion of it. Much of the inland traffic is carried on by the canals above mentioned, and by the railways (now extending to all parts of Ireland), and consists principally of articles of dairy and farm produce from the central counties. The principal banks are the Bank of Ireland, the Royal, the National, Provincial, Hibernian, and Munster, with some private establishments.

The great educational institution of D. is Trinity College and university. See DUBLIN, UNIVERSITY OF. There is also a Catholic university, the medical school of which has been very successful. In regard to schools, D. is not well supplied. The education of the upper and middle classes is left chiefly to private enterprise. For the humbler classes, much has been done by the national board (whose model schools are attended by large numbers of children), by the church education society, the Christian brothers, and Catholic brotherhoods and sisterhoods, and other agencies. There are many literary and scientific societies, dealing with subjects of general knowledge, or with matters of local or national interest. There are two botanic gardens—one at Glasnevin, belonging to the royal Dublin society, and one near Donnybrook, connected with the university. The hospitals, asylums, orphanages, and other charitable institutions are numerous, and liberally maintained.

The municipal affairs are under the control of a town council, which consists of a lord mayor, aldermen, and councilors. There is a large police force, which has charge of the city and of all the surrounding country as far as 8 m. from the castle. The city sends four members to parliament. The population of the municipal borough in 1871 was 246,326, of whom 195,180 were Roman Catholics, 39,897 Episcopalians, 4,517 Presbyterians, and the rest of other denominations; of parl. bor. 267,717. Pop. of municipal borough, '91, 245,001; of parliamentary borough, 269,700; and of the metropolitan police district, 361,891.

The environs of D. are especially beautiful. Rathmines, a southern suburb, has become a large township, and is the favorite residence of the wealthier part of the mercantile community. Glasnevin, on the n., deserves special notice as the favorite residence of the poet Tickell, of Addison, Steele, Parnell, Swift, Sheridan, and many other celebrated men. In the cemetery at Glasnevin lie the remains of Curran, O'Connell, and Tom Steele. The Phoenix park is a magnificent area of nearly 2,000 acres, in some parts level, in others with broken ground, having a large amount of timber and brushwood, which shelter immense herds of deer. It affords ample scope for military reviews, and is most extensively used by the inhabitants of D. of all classes for recreation. D., as a whole, with its magnificent bay—which has often been compared to the bay of Naples—splendid park, massive public buildings, wide streets, spacious and well-kept squares, clean and elegant quays, and beautiful environs, is one of the most handsome and delightful capitals of Europe.

There are numerous places of worship, Catholic and Protestant, monasteries, convents, friaries, and a Jewish synagogue. The most remarkable among the Protestant churches are St. Patrick's cathedral, restored by the munificence of a single individual, and Christ church, which has also undergone restoration; and among the Catholic, St. Mary's, St. Saviour's, St. Augustine's, St. Kivin's.

The lord-lieutenant of Ireland, of late oftener known as the viceroy, holds his court in Dublin castle during the winter months, and in the summer season removes to the lodge, situated beyond Phoenix park.

DUBLIN, UNIVERSITY OF. The first university of Dublin was established in connection with St. Patrick's cathedral in 1320; but for want of proper endowments, it never prospered, and dragged out a miserable existence till, probably, the dissolution of the cathedral by Henry VIII.

Foundation.—The existing university was founded in 1591–92, and stands in the position of being a college with university powers. Trinity college, indeed, was intended merely as the *nucleus* of a university, but as no colleges have since been added, it remains in undisputed possession of all university privileges. Queen Elizabeth provided the charter, the corporation of Dublin bestowed the ground and ruins of the suppressed monastery of All-Hallows, and the Irish gentry supplied by subscription the funds necessary for the erection of the buildings. The income of the college was very limited and very precarious, till James I. endowed it with certain estates in the province of Ulster, and a yearly pension of £388 15s., English money, from the public purse.

Constitution.—By queen Elizabeth's charter, the corporation was to consist of a provost, three fellows, and three scholars, in the name of more, with the power of purchasing, taking, and possessing any manors, tenements, etc., from the sovereign, or from any other person. On a vacancy in the provostship, the fellows were entitled to elect a fit successor, and the election of fellows and scholars lay with the provost and fellows. The provost and fellows had full powers to enact statutes, confer degrees, and prescribe the necessary exercises for graduation, and to do all the work of tuition. Defects soon began to show themselves in this constitution, but they were remedied by the new statutes of archbishop Laud, which were definitely published in 1637, and which are in the main still in force. By these the election of provost was given to the crown.

Parliamentary Representation.—In 1613, James I. conferred on the university the right of sending two members to the Irish parliament. One of these was taken away at the union in 1800, but was again restored by the reform bill of 1832. The electors were formerly the provost, fellows, and scholars; but, in 1832, the privilege was extended to masters of arts, and those of higher degree.

Board.—The provost and senior fellows form the board of management of the college. They meet every Saturday, and transact all the financial and other business.

Council.—By letters-patent of 1874, a council was established to co-operate with the board in the regulation of the studies of the university, and in the appointment and regulation of the tenure of office and duties of professors. This council consists of 17 members—namely, the provost of Trinity college, 4 members elected by the senior fellows, 4 elected by the junior fellows, 4 by the professors, and 4 by the senate of the university.

Officers.—The government and working of the university are intrusted to the following officers: the chancellor, vice-chancellor, provost, two proctors (one chosen from the senior, and one from the junior fellows), a senior lecturer (who regulates the public examinations), two deans, and a censor, a librarian, registrars, an auditor, professors, and examiners.

Senate.—The chancellor (or, in his absence, the vice-chancellor or *pro vice-chancellor*), all masters of arts, and doctors of the three faculties, whose names are on the college books, form the senate of the university. The senate elects the chancellor, and confers degrees.

Caput.—The caput of the senate consists of the chancellor, vice-chancellor, provost (or vice-provost), and senior master *non-regent*, who is chosen by the senate. Every *grace* (for the bestowal of a degree) must first receive the sanction of the provost and senior fellows, be afterwards approved of by the caput (each member of which has a *negative vote*), and finally be confirmed by the senate in public congregation.

Provost.—The provost, who is appointed by the crown, may be a layman, of any religious denomination. He enjoys an income of about £3,000 a year.

Fellows (Senior).—The fellows are all chosen, in the first instance, by examination; but the seniors are promoted from the juniors, in order of seniority. They have no stated duties, except those connected with the general management of the college affairs. The average income of a senior fellow, from all sources, is about £1380 per annum.

Fellows (Junior).—The junior fellows are elected by examination. They form the great teaching staff of the college, and do all the duties of lecturing and examining the undergraduates. Most of them are tutors, and their income, which may average £600 a year, is derived partly from a salary given by the college, and partly from their duties as tutors, lecturers, and examiners. Fellowships were formerly tenable only by members of the Episcopal church, but by the recent act all such religious restrictions were abolished. The number of the junior fellows has been altered from time to time, but by a queen's letter, issued some years ago, it was fixed at 23—the then number of 27 being gradually reducible. The law of celibacy, imposed in the reign of Charles I., was repealed in 1840.

Professors.—There is a very complete staff of professors, who represent almost all subjects of human knowledge. Besides a full complement of lecturers in divinity, natural philosophy, mathematics, law, and medicine, there are professors of ancient, oriental, and modern languages (Irish, Arabic, and Sanscrit being among the number), moral philosophy, oratory and English literature, modern history, political economy, natural history, botany, geology, mineralogy, civil engineering, etc.

Scholars.—The scholars, 70 in number, are elected from among the undergraduates. They are members of the corporation, and have the university franchise. Scholarships (which are tenable for five years) are gained by public competition—some being assigned for classics, and others for science; the provost and senior fellows, assisted by some of the junior fellows or professors, if desired, are the examiners. The various emoluments of a scholar, arising from salary, remission of fees, rooms, commons, etc., amount to about £50 per annum. There are also minor scholarships for the encouragement of the study of divinity and of the Irish language; while others are connected with the royal and endowed schools. Forty exhibitions of £25 per annum each, tenable for two years, have been recently founded, 12 of which are given in each year to students immediately after entrance, and 8 to those who have concluded their second year.

Students.—There are four grades of students. 1. Noblemen, sons of noblemen, and baronets, who have certain special privileges; the first two being allowed the degree of *B.A. per specialem gratiam*. 2. Fellow-commoners, who dine at the fellows' table. 3. Pensioners, who form the great body of the students. 4. Sizar, who have rooms and commons free. The sizars are limited to 30; they are elected by competitive examination, and hold their sizarships (worth about £37 per annum) for four years. Each rank has a dress peculiar to itself.

Entrance.—Students are admitted to the college after an examination in a prescribed course of classics, arithmetic and algebra, English history and composition, and modern geography. The honor of *first place* at entrance examination is keenly contested; and there are, besides, prizes awarded for excellence in special branches of the entrance course, and also for Hebrew.

Tutors.—Each student must at entrance place himself under one of the 18 junior fellows who are tutors. These stand to their pupils *in loco parentis*, and have charge of their tuition, though each tutor does not necessarily teach his own pupils.

System.—To proceed to the degree of A.B., a student must keep terms for four years, two terms at least being necessary in each year. Terms may be kept either by residence, and attendance on lectures, or by simply appearing on a stated day in the public hall, and passing a creditable examination in a prescribed course. Lectures are delivered on the different subjects of each term examination by the tutors, the honor examiners, and the university professors; and prizes of the value of £4 and £3 are awarded at the Michaelmas examination to the *first* and the *second* honor men respectively. In the other terms (Hilary and Trinity), parchment certificates reward the diligent. At the end of the fourth year, gold and silver medals are awarded to the senior and junior moderators. Students of the first year are called junior freshmen; those of the second, senior freshmen; of the third, junior sophisters; and of the fourth, senior sophisters. All students must pursue the following course: *first year*, Latin, Greek, mathematics; *second year*, Latin, Greek, mathematics, logic, and metaphysics; *third year*, Latin, Greek, physics, logic, and metaphysics; *fourth year*, Latin, Greek,

physics (both mathematical and experimental), astronomy, and ethics. For those who aspire to honors, the course is much more extensive than that for mere *pass*.

Degrees.—Term examinations having been duly passed, the student is promoted to the degree of A.B., which is conferred by the senate in full congregation. The *comitia* for granting degrees are held on Shrove Tuesday and the last Wednesday in Trinity and Michaelmas terms. Those students who, at the final ordeal of the fourth year, stand highest in an examination over an extra course in (1) mathematics and mathematical physics; (2) classics; (3) mental and moral philosophy; (4) experimental science; (5) natural science; (6) history and political science; (7) modern literature, are called (according to merit) senior or junior moderators. These form the first class of graduates, the second being called respondents. The third consists of "unclassified candidates." The higher degrees are procurable after the lapse of a fixed number of years, and on the performance of certain exercises, and the payment of fees.

Fees.—For entrance and first half-year the fees are—Noblemen, £60; fellow-commoner, £30; pensioner, £15; sizar, £5 1s. 3d. Other half-years, £33 12s., £16 16s., and £8 8s.—the sizars being exempt. This does not include robes and commons. For degrees, the fees for pensioners are—A.B., £8 17s. 6d.; A.M., £9 16s. 6d.; LL.B., £11 15s.; LL.D., £22; B.D., £13 15s.; D.D., £26; M.B., £11 15s.; M.D., £22.

Divinity, Medical, and Engineering Schools.—Connected with Trinity college there are schools for medicine and engineering. The Divinity school of the church of Ireland is also in connection with the university. Graduates in medicine and in engineering must previously graduate in arts. The divinity testimonium is obtained after two years' attendance on lectures, with an examination at the end of each term.

Church Patronage.—The university formerly held a large and valuable patronage, but this has been abolished by the recent church act.

Studentships.—In 1859, 14 studentships were founded, worth £100 a year each, tenable for seven years, to encourage graduates in the pursuit of some special branch of study which they may afterwards be called on to teach, should they become fellows and lecturers. Two are given every year, and (like every other prize or distinction in the university, not connected with the divinity school) are open to persons of all religious denominations. They are awarded to those candidates at the degree examination who take the highest places in science and classics respectively.

Among the famous graduates are Berkeley, Sir W. Hamilton, Sheridan, Swift, Goldsmith, etc.

DUBNIT'ZA, a t. in the principality of Bulgaria, 25 m. s.w. of Sophia. It has extensive iron-works, and a pop. of about 8,000.

DUBNO, a t. in Russia, in the government of Volhynia. Its trade is chiefly in corn, flax, tobacco, fish, and cattle. A large fair is also held here at Whitsuntide. Pop. about 7,500.

DUBOIS', a co. in s. w. Indiana, bounded on the n. by White river, and having railroad connection with the Ohio; 410 sq. m.; pop. '90, 20,253. It has a varied surface, with much forest land; good soil, and abundant coal. Chief productions, wheat, corn, and tobacco. Co. seat, Jasper.

DUBOIS, a borough in Clearfield co., Pa.; on the Allegheny Valley, the Buffalo, Rochester, and Pittsburgh, the Mahoning Valley, the Pennsylvania, and the West Jersey and Seashore railroads; 19 miles n.w. of Clearfield, the county seat. It contains a high school, business college, and national bank; has electric lights and daily and weekly newspapers; and is principally engaged in coal mining and lumbering. Pop. '90, 6,149.

DUBOIS, ANTOINE, Baron, 1756-1837; a French surgeon; in 1790, professor in the royal college of surgery; one of the savants selected by Bonaparte to accompany the expedition to Egypt. It is said that at the accouchement of the empress (Marie Louise) his skill saved the lives of both mother and child. He was surgeon-in-chief of the hospital still known by his name. His publications were few, but he devised many new processes, and invented several new instruments.

DUBOIS, GUILLAUME, Cardinal, was b. 6th Sept., 1656, at Brives-la-Gaillarde, in Auvergne, where his father was an apothecary. At the age of 12, he came to Paris, and entered the college of Saint Michel, as a domestic of the principal. Here he made such good use of his opportunities for acquiring knowledge, that he was afterwards selected as tutor to the son of a merchant named Mauroy, and gradually rose till he became tutor to the young duc de Chartres. Although of an ugly exterior, he contrived, by his mixture of wit and hypocrisy, to win the esteem of the boy's mother, while he possessed the most unlimited confidence of his pupil, partly through their common love of letters, and partly because he took upon himself the odious office of pander to his vices. His public career commenced after the marriage of his pupil, in 1692, with Mademoiselle Blois, a natural but legitimized daughter of Louis XIV. He then received from that monarch, for his services in bringing about the match, a gift of the abbey of St. Just, in Picardy. He was next attached to the French embassy at the court of London, where he formed some important political connections. On his return, he became pri-

vate secretary to his old pupil; and when the latter (now duke of Orleans) became regent in 1715, D. became virtually the most powerful man in France. The great act of his life was the famous treaty signed at La Haye, 14th Jan., 1717, and known as the *triple alliance*, between England, Holland, and France. The importance of this act lies in the circumstance that it effectually changed the foreign policy of France, in spite of the French princes, in spite of the traditions of Louis XIV., in spite of the dislike of the English king for the regent, and finally, in spite of Cardinal Alberoni himself, the Spanish minister. In reward for his brilliant dexterity, D. received the office of minister of foreign affairs, and in 1720, on the solicitation of George I. of England, was appointed to the vacant archbishopric of Cambrai. In 1721, he obtained the cardinal's hat, and in the following year became prime minister of France, when his authority seemed unbounded. He died 10th Aug., 1723, a victim to hard work and the wildest debauchery.

DUBOIS, JEAN ANTOINE, 1765-1848; a French missionary in the East Indies, where he passed 32 years; author of *Letters on the State of Christianity in India*. He also contributed to the *Bulletin des Sciences*, and the journals of the Asiatic societies. His best known work was *Description of the Character, Manners, and Customs of the People of India, and of their Institutions, religious and civil*, which was published in English by the East India company, and subsequently in French at Paris.

DUBOIS, JOHN, 1764-1842; b. Paris. He graduated at the coll. of Louis le Grand; entered the seminary of St. Magloire; and was ordained priest, 1787. When the French revolution broke out, he refused to submit to its requirements and was forced to flee. Landing in Va., 1791, he was called by Bp. Carroll to Frederick, Md. He built the first Rom. Cath. church in that neighborhood, 1806, and founded Mt. St. Mary's coll. at Emmitsburg, 1809, of which institution he became pres. -In 1826 he was appointed bp. of New York.

DU BOIS-REYMOND, EMIL HEINRICH, b. 1818; a German scientist; member and perpetual secretary of the imperial academy at Berlin, imperial privy counselor, professor of physiology in the university of Berlin, and director of the physiological apparatus and of the physiological laboratory. He has made many important researches in animal electricity, and published invaluable works on that theme, and on recent progress in anatomy and physiology.

DUBOSSARI, or NOVIE DUBOSSARI, a t. in the government of Kherson, European Russia, on the Dniester, 101 m. above Odessa; pop. about 10,500. It is in a picturesque situation, surrounded with fertile fields and gardens, and has a number of important public institutions. Trade is chiefly in wine, tobacco, cattle, and grain.

DUBOVKA, a t. of European Russia, in the government of Saratov, is situated on the eastern slope of the Sarpa hills, on the right bank of the Volga, in lat. about 49° n., and long. 44° 45' east. It is a depot for goods brought from the northern provinces, which it forwards to Katschalinskala, a town about 40 m. distant from D., and situated on the Don. The produce is thence conveyed by the Don to the southern provinces. D. has some trade in wood, oil, iron, and manufactured articles. Pop. 14,500.

DUBS, JAKOB, b. 1822; a Swiss politician; studied law at Heidelberg, Bern, and Zurich; in 1847, he was elected to the grand council; afterwards to other offices in his native canton. In 1857, he was president of the federal court; and, 1864 and 1870, president of the confederation. In politics he was a liberal, and gave aid in many reforms. He is the author of a number of political works. He d. 1879.

DUBUFE, ÉDOUARD, b. Paris, 1820; studied under his father, Claude Marie, and Paul Delaroche. He successfully followed his father's sentimental style, but afterwards painted Scriptural subjects. His later work is seen chiefly in portraits, among them the empress Eugénie, Rosa Bonheur, and the members of the congress of Paris. Three of his large compositions have been exhibited in the United States—"The Prodigal Son," "The Conscript's Departure," and "The Soldier's Return." He d. 1883.

DUBUQUE, a co. in e. Iowa, on the Mississippi river, watered by branches of the Maquoketa river, and crossed by several railroads; 600 sq. m.; pop. '90, 49,848. It is hilly and well timbered, with fertile soil, producing wheat, corn, butter, etc. There is abundance of lead ore, and more than 100 mines are in operation. Co. seat, Dubuque.

DUBUQUE, city, port of entry, and co. seat of Dubuque co., Ia.; on the w. bank of the Mississippi; 337 m. n. of St. Louis, and 247 m. below St. Paul. It is picturesquely situated on a low terrace and high bluffs, and is connected with East D. on the Illinois side by two bridges, one 2000 ft. long. Steamboats run to St. Paul and to St. Louis during the season of navigation, and there are several railroads, among them the Chicago, Milwaukee and St. Paul; the Illinois Central, and the Burlington. Its lower portion, the business quarter, is 20 ft. above the water; the bluffs, on which are the residence streets, are 200 ft. high, but an inclined plane cable road connects the two parts and three electric railways. Among the buildings are the city hall, market, U. S. building, and Roman Catholic cathedral. D. is the centre of the lead region of Iowa, n. w. Illinois, and s. w. Wisconsin, and the mining industry has been revived, and zinc works established. A fine agricultural region surrounds the city, and the river commerce in produce

is large. There are national and other banks, public parks, public library, and several hospitals and asylums. The winter harbor for boats on the upper Mississippi is here. The former Roman Catholic diocese of Dubuque was created an archdiocese in 1893. Of educational institutions there are St. Joseph's college and academy, and St. Mary's academy, both Roman Catholic, the Iowa institute of science and art, a German Presbyterian divinity school, and public high school. There are manufactories for farming tools, engines, machinery, leather, bricks, lead, flour, steamboats, etc. Two gunboats for the U. S. navy were built here. The place was named from Julien Dubuque, a French Canadian, who settled on the spot in 1778. The first permanent settlement in the present State was made here in 1833, the town was incorporated 1837, and was chartered as a city in 1846. Pop. '90, 30,311.

DU CAMP, MAXIME, French author, born in Paris, Feb. 8, 1822. On leaving college, he undertook a first voyage to the Orient, and in 1849 he was sent there by the government. These two voyages were described by him in several books, illustrated from photographs taken by himself. His principal other works are: Poetical, *Chants Modernes*, *Les Convictions* (1858) and *Chants de la Matière*; novels, *Mémoires d'un Suicide* (1853), *Les six Aventures* (1857), *L'Homme au Bracelet d'Or* (1862), *Les Buteurs de Cendre* (1866); historical, *Les Convulsions de Paris* (1874-79), *Paris—ses Organes, ses Fonctions, sa Vie* (1869-75); as well as several volumes of art criticism and books of travel. Du Camp became a member of the Academy in 1880. He died in 1894.

DUCANGE, CHARLES DUFRESNE, SEIGNEUR DU CANGE, generally styled **DUCANGE**, a French author, distinguished by his historical and linguistic writings, belonged to an ancient family of Picardy, and was born at Amiens, 18th Dec., 1610. After having received the rudiments of a scientific education at the Jesuits' college in his native town, he studied law at Orleans, and in 1631 became parliamentary advocate at Paris, where he continued to reside till his death, 23d Oct., 1688. There was scarcely any branch of science with which he was unacquainted, but his favorite studies were classical philology and history. Among his historical works may be mentioned the *Histoire de l'Empire de Constantinople sous les Empereurs Français* (Paris, 1657). He also edited, along with other scholars, the *Corpus Historiæ Byzantinæ* (Paris, 1680), and Joinville's *Histoire de Saint Louis, Roi de France*. His two principal works, however, are the *Glossarium ad Scriptores Mediæ et Infimæ Latinitatis* (3 vols. fol., Paris, 1678; much enlarged by the Benedictines of St. Maur, 6 vols. fol., Paris, 1733-36, to which four supplementary volumes were afterwards added by Carpentier, a Benedictine), and the *Glossarium ad Scriptores Mediæ et Infimæ Græcitatatis* (Paris, 1688). Both works display great learning, good judgment, and admirable industry, and are extremely valuable contributions to the study of the history and antiquities of the middle ages. A new edition of the Latin glossary, incorporating all the previous supplements, together with additions of his own, was published by G. A. Henschel (7 vols. 4to, Paris, 1842-53); and supplementary volumes (*Latino-Germanicum*) were added by Diefenbach (Francf. 1857 and 1867). A new edition in 10 volumes has since been issued (1883-). Ducange left a large quantity of valuable manuscripts, which have been collected in the university of Paris.

DU'CAS, MICHAEL, lived about the middle of the 15th c.; a Greek historian, of a family that gave several emperors to Constantinople. After the fall of that city he was employed in diplomatic business. He wrote a history beginning at the death of John Palæologus and extending to the capture of Lesbos in 1462, which is a valuable source of information concerning the close of the Greek empire.

DUC'AT, one of the most extensively used names for a coin, mostly of gold. Ducats were first coined in the 12th c. in Sicily, and took their name from the legend found on those early Sicilian pieces: *Sit tibi, Christe, datus, quem tu regis, iste Ducatus (ducatus means duchy)*. Such coins were extensively issued after the 12th c. in Italy, especially at Venice. Venice ducats were called *Zecchini*, from *Zecca*, where the mint was situated. The ducat was adopted in 1559 by the imperial diet of Germany into the currency of the empire, and was afterwards coined in the several German states, and over the whole of the north of the European continent, Russia included. They generally bore the likenesses of the sovereign princes. The ducat varied in weight and fineness; by far the most common, which was current in Austria, Russia, Hamburg, etc., weighed 54 troy grains, American value about \$2.30. The modern Italian ducat was of much less value. The gold ducat of Venice was valued at \$1.50. In the (late) kingdom of the Two Sicilies, the ducat (ducato del regno) was a silver coin and money of account, forming the unit of the currency, being divided into 100 grani, in the island of Sicily into 100 bajocchi. There are few silver ducats, however, in existence. The ducat = \$0.80 American. There are various kinds of the Spanish *ducado*, generally translated dollar. The *ducado de plata*, or silver ducat, hard = \$1.00.

DUCA'TO, CAPE (anciently *Leucætēs*), a headland at the southern extremity of a promontory of Santa Maura, one of the Ionian island, in lat. 38° 34' n., and long. 20° 32' east. Cape D. was in ancient times dreaded by mariners, and the modern Greek sailor still fears the strong currents and the fierce gales which he has to encounter there. A point on the western side of the *Leucadian* promontory is called *Sappho's Leap*, as it was supposed that here the poetess precipitated herself into the sea. It is a white, broken cliff, rising perpendicularly from the water to the height of about 2,000 feet.

DU CHAILLU, PAUL BELLONI, born Paris, 1835; son of a trader to the w. coast of Africa, where the boy passed some time at an early age, and acquired knowledge of the language and modes of life of the neighboring tribes, and of natural history. In 1852, he traveled through the United States, and published a series of papers on the Gaboon country. In Oct., 1855, he left New York to explore equatorial Africa, and spent nearly four years in the work, reaching to about 14° 15' east. During this trip he shot and stuffed more than 2,000 birds, of which 60 were species before unknown. He also killed more than 1000 animals, among them several gorillas, a species probably never before seen by Europeans. In 1859, he returned to the United States with his natural history specimens and a great collection of arms and domestic implements. He published an account of his trip in *Explorations and Adventures in Equatorial Africa*. He was one of the first to describe the gorilla; and the truth of his narrative was strongly attacked, and as stoutly defended, mainly by English savants. This provoked the traveler to undertake a second journey, and he sailed from England for that purpose in Aug., 1863. He went over much of his course on his first trip, but explored some new regions. In Sept., 1865, he was compelled to return to the coast in consequence of the hostility of the natives, having lost everything except his journals. This venture was detailed in *A Journey to Ashango Land*. He lectured in the United States, where he fixed his residence, and in 1872-73, made a trip in Norway, Lapland, Sweden, and Finland. Besides the works named he has published *The Gorilla Country; Wild Life; Lost in the Jungle; The Land of the Midnight Sun; The Viking Age*. In 1893 he was presented with a silver loving cup by the American Geographical Society for his discoveries of the gorilla, the pygmies, and the great equatorial forest.

DUCHÉ, JACOB, D.D., 1737-98; b. Philadelphia; graduate of the college of that city in 1757, completing his education at Cambridge, Eng. In 1775, he was rector of Christ church in Philadelphia. The next year he was chaplain to the first continental congress, and gave all his salary for the relief of the families of soldiers killed in the war. His courage gave out on the capture of Philadelphia by the British, 1777, and he wrote to Washington urging him to cease what seemed to be a hopeless struggle. The letter was laid before congress, and Duché fled to England, and his property was confiscated. He returned in 1790, but could not regain position or influence.

DUCHESNE, ANDRÉ (in Latin, Andreas Chesnius, or Duchenius, or Quercetanus), the father of French history, was b. at Ile-Boucharde, in the old province of Touraine, in May, 1584, and studied at Loudun and Paris. History and geography were his favorite studies from his youth, and under Richelieu's ministry he was appointed royal geographer and historiographer. He d. 30th May, 1640, by a sad accident, having been crushed against a wall by a carriage in a narrow street. His collection of the *Historiae Francorum Scriptores Coetanei ab ipsius gentis origine ad Philippum IV. tempora* (5 vols., Paris, 1636-49), is particularly important. It was continued from the third volume by his son, FRANÇOIS DUCHESNE (born 1616; died, after having likewise been appointed historiographer, in 1693), and contains much that may be sought for in vain in Bouquet's collection. Of his other numerous writings, we may mention, as deserving of special notice, the *Historiae Normannorum Scriptores Antiqui* (Paris, 1619); *Histoire Généalogique de la Maison de Montmorency et de Laval* (Paris, 1624); and *Histoire Généalogique de la Maison de Vergi* (Paris, 1625).

DUCHESNE, JACQUES CHARLES RENÉ ACHILLE, military officer, b. in Sens, France, March 3, 1837; graduated at St. Cyr in 1857; became general of brigade in 1888 and of division in 1893. He distinguished himself in the Franco-Prussian war, 1870-71, at Tonkin, 1883, and in Admiral Courbet's campaign in Formosa; subsequently commanded the infantry division at Bourges, and the 14th division at Belfort, and in 1895 was appointed commandant of the expedition which conquered Madagascar.

DUCHOBORTZI, a Russian religious sect, of the origin of which nothing is very certainly known, and which, although conjecturally referred by count Krasinski to the Patarenes (see CATHARI), cannot be traced beyond the middle of the 18th c., when it was found to exist in different parts of Russia; and its members became exposed to penalties by their refusal to serve in the army. The D. hold the doctrine of the Trinity, and are chiefly distinguished by their holding that human souls existed before the creation of the world, and fell in that former existence, from which the fall of Adam and a continual tendency to fall have proceeded; and by their ascribing hidden mysterious meanings to all parts of the Bible, for the knowledge of which they depend on inward light. They are extreme mystics. They reject the use of pictures common in the Russian Greek church. They neither observe baptism nor the Lord's supper. In their religious meetings they salute each other with bows and kisses: they pray, sing psalms, and exhort or expound the Scriptures. They are, however, generally very illiterate and ignorant. On the accession of the emperor Alexander I., they received the most complete toleration, and were allowed to settle by themselves on the bank of the Molochna in the s. of Russia. Here, however, an impostor named Kapustin prevailed on them to receive him as a prophet, taught them the transmigration of souls, and made them believe that he himself was animated by the soul of Jesus Christ; and it would appear that, in consequence of disputes arising among them concerning him, great numbers were buried alive, and otherwise put to death by the rest, on which the settlements on the Molochna were broken up in 1841, and great part of the people transferred to the provinces beyond the Caucasus.

DUCK. See **ANAS**. The broader bill, laminated and not toothed, distinguishes the Linnaean genus *anas* from *mergus* (including smews, mergansers, and the goosander). In recent ornithological systems, however, it is divided into numerous genera, but three chief groups are usually recognized, corresponding to swans, geese, and ducks of popular nomenclature. See **GOOSE** and **SWAN**. The group to which the name D. is sometimes extended, both by scientific writers and in popular language, is characterized by greater breadth of bill than either the swans or geese. Their food is chiefly animal, whilst that of both swans and geese is in great part vegetable. Their legs are shorter and placed further backward than those of geese, so that they move with greater difficulty and with a more waddling gait on land, and their necks are shorter than those of geese, and much shorter than those of swans, although in this character there is a considerable difference between different species. There is a very marked difference in plumage between the males and females, which is not the case in any corresponding degree in swans and geese. They exhibit also a peculiar anatomical character in a large dilation of their trachea (windpipe) on each side at its bifurcation. This great group of ducks is subdivided into two sections; one section characterized by a webbed or broadly margined hind-toe, the other by a hind-toe destitute of membrane. These characters are connected with important differences in other respects, and particularly in habits; the ducks of the first section being chiefly oceanic, living more exclusively on animal food, and diving readily and frequently in pursuit of it; whilst those of the second section are more generally inhabitants of lakes and other inland waters, showing a preference for shallow waters. Those of the first section also have the feet placed further backward than those of the second; those of the second have generally longer wings than those of the first, and a longer neck by which they are adapted for seeking their food by dabbling in muddy shallows, they less frequently dive, and when alarmed, generally seek safety by taking wing. Many of both sections are migratory, and spend the summer in arctic and sub-arctic regions. Not a few of them are common to the northern parts of both the eastern and western continents. Their plumage is remarkably thick, soft, and compact. The tongue, which, unlike that of most birds, is large and fleshy, assists in the selection of food. To the first or oceanic section of ducks belong scoters, garrots, eiders, pochards, scaups, harelds, etc.; to the second section belong sheldrakes, shovellers, musk ducks, summer D., pintails, gadwalls, teals, widgeons, bluewings, etc. Most of these varieties will be described under their respective names.

The **COMMON DUCK**, or **DOMESTIC DUCK** (*anas boschas*), known also in its wild state as the **WILD DUCK** or **MALLARD**, belongs to a genus, or sub-genus, of the second section, characterized by a flattish broad bill, longer than the head, not contracted, nor much dilated, towards the tip, and not much elevated at the base, destitute of tubercle at the base, the denticulations of the upper mandible (ends of the laminae) scarcely projecting beyond the margin, and a short and rather pointed tail of 16 feathers. Even as thus characterized, it includes teals (q.v.), which are by some ornithologists constituted into a separate genus. The male (drake) of the common D. has the four middle tail-feathers recurved. The deep emerald green of the head and upper part of the neck, the white collar which separates the green from the dark chestnut of the lower part of the neck, and the deep blue iridescent *speculum* of the wing—formed by the outer portion of the outer web of the secondaries—are also marked characteristics of this beautiful bird; the plumage of which exhibits greater brightness of colors—during the breeding season at least—in the wild than in the domestic variety. At the close of the breeding season, the male of the wild-duck assumes for a time a plumage more sober, and resembling that of the female; but before winter, the splendid plumage proper to his sex is again acquired. The mallard or wild-duck is a widely-distributed bird, being found in the northern parts of Europe, Asia, and America, and extending southward as far as Florida—where it is abundant—and the West Indies, although in the old world it is not known as belonging to regions of similar climate. It was formerly much more abundant than it now is in Britain, the drainage of marshes having apparently tended more than any other cause to the diminution of its numbers. Multitudes of mallards, however, still visit the fen counties of England in winter; and great numbers are taken in decoys, along with other *anatide*, and sent to the London market. See **WILDFOWL**. Many wild-ducks, however, still breed in Britain, sometimes near the lakes or rivers which they frequent, sometimes in more elevated moorish districts, from which the parents often take opportunity of bringing their very young brood to the lower waters, by swimming down the streams on some occasion of their being swollen by rain, and it is interesting to see the little creatures hurried on, without injury, by the current, and passing along narrow rapids and over waterfalls of considerable height, much as pieces of cork might do, and with as little apparent injury. The nest is composed of grass, intermixed and lined with down, and the eggs are usually 9 to 12 in number.

This species, in a wild state, always pairs, but in domestication it becomes polygamous, and the care of the young is left entirely to the female. It has been long common in the poultry-yard, being valued for its eggs and its flesh; and there are breeds, as the Aylesbury D., etc., remarkable for their great size and delicacy of flesh. In situations where they have ready access to a lake, pond, or stream, ducks are easily managed, and very useful poultry. In other circumstances, they cannot be kept with advantage.

The species most nearly allied to the common D. is said to be the **JAVANESE DUCK**

(*A. Javanensis*). The **BLACK DUCK** or **DUSKY DUCK** (*A. obscura*) of North America is also very nearly allied to it, and is generally distributed from Labrador to Texas. The summer D. or wood D. of North America, and the Mandarin D. or Chinese D., belong to a nearly allied genus or sub-genus (*dendronessa*), with shorter bill and pendent occipital crest. See **SUMMER DUCK**. The **TREE DUCK**, or **WHISTLING DUCK**, of the warmer parts of America, also belongs to a distinct but nearly allied genus or sub-genus (*dendrocygna*). See illus., **FOWL, ETC.**, vol. VI.

DUCK-BILL, *Ornithorhynchus*, or *Platypus*, a genus of *mammalia*, of the order *monotremata* (q.v.). Only one species is fully ascertained, *O. paradoxus* or *P. anatinus*. It inhabits the rivers of Australia, Papua, and Tasmania. In the Australian colonies it is generally called **WATER MOLE**. The first descriptions of this singular quadruped were received with incredulity, and even when a stuffed specimen was brought to England, it was suspected to have been ingeniously fabricated. The whole length, including bill and tail, is usually from 20 to 23 inches. The body is rather long and compressed, thickly covered with very glossy hair, among the roots of which there is a layer of soft short waterproof felt or wadding. The head is small and round, with small bright eyes, and no external ears, although the internal ears are perfectly developed, and the hearing acute; and instead of the muzzle, mouth, and teeth of an ordinary quadruped, the creature is furnished with a bill like that of a duck, but broader in proportion, near the extremity of the upper mandible of which the orifices of the nostrils are placed. The bill is covered with a leathery membrane. There are no true teeth, but the bill has small transverse laminae, like the bill of a duck; and at its base, on each side of each jaw, are two horny protuberances without roots or bulbs. The tongue is beset with villosities, does not extend to the extremity of the bill, and bears at its base what has been described as another tongue of a thicker form, and with two little fleshy points in front. The legs are short; the fore-feet have each five toes, with strong burrowing claws, and a connecting membrane for swimming, which extends even beyond the claws, but is capable of being folded back, so as not to impede their use in burrowing. The hind-feet are smaller than the fore-feet; they have each five toes armed with claws, and webbed, but the web does not extend beyond the base of the claws. The hind-feet of the male are armed with sharp spurs, like those of a cock, which are merely rudimentary in the female. These spurs were at one time erroneously supposed to be venomous. The tail is strong, broad, and flattened, about half as long as the body, covered with longer and coarser hairs, and nearly naked on its under surface. The duck-bill, besides the characteristics of the *monotremata*, exhibits other anatomical peculiarities which resemble those of birds, and some—principally osteological—which even resemble those of saurian reptiles. It lives chiefly in the water, and seeks its food by means of its bill in the mud, like ducks. Its food consists chiefly of aquatic insects, mollusks, etc.; but it is said also to feed on small fish, and even on vegetable food; and in confinement, it can be fed on worms, mince-meat, or egg, and bread and milk. It makes serpentine burrows of great length—20 or even 50 ft.—in river-banks, entering near the water's edge, and enlarged at the termination into a receptacle or nest, which is furnished with dry weeds for the accommodation both of parents and young. The young are produced in a very imperfect state: the duck-bill is indeed strictly ovoviviparous; the fetus receives no nutriment from the parent before birth, except what it derives from the ovum, which, however, is hatched within the body of the parent; but the young are suckled, and the mouth is adapted to this by the comparative shortness of the bill and greater length of tongue at this period of life. The duck-bill is lively and active, and so readily alarmed by the appearance of danger as not to be easily shot, diving before aim can be taken. It is usually to be seen with only its head above the surface of the water. It prefers the twilight to the glare of day. Its voice resembles the growl of a small puppy. It carefully dresses and pecks its fur. When asleep, it rolls itself up into a ball. See illus., **MARSUPIALIA**, vol. IX.

DUCK CREEK, a water-course of central Australia, is the largest of the channels which drain into the Darling (q.v.).

DUCKING-STOOL, an apparatus at one time in use in Britain for the punishment of scolding wives. The ducking-stool grew out of the cucking-stool, which was not, as many have supposed, a mere difference of name for the same thing. The cucking-stool of itself did not admit of the ducking of its occupants. It was a simple chair in which the offender was placed, usually before her or his (for the cucking-stool was not so specially for women as the ducking-stool) own door, to be pelted and insulted by the mob. In conjunction with another instrument of degradation, however—the tumbrel—the cucking-stool was occasionally used for ducking; but the ducking-stool *par excellence* was specially made for purposes of immersion. There were various examples of the ducking-stool. Sometimes it “consisted of a rough strong chair attached to one end of a beam, which worked on a pivot on a post bedded into the ground at the edge of the dam,” or the river, as the case might be. “The woman was placed in the chair with her arms drawn backwards; a bar was placed across her back and in front of her elbows;” another bar held her upright, and there were cords to tie her securely in. The executors of the punishment then took hold of a chain at the opposite end, and gave her a ducking on the “see-saw” principle. A ducking-stool was in use for actual duck-

ing at Leominster as recently as 1809. The beam to which the chair was attached was 23½ ft. in length, the ducking being administered in the manner previously described.

DUCKWEED, *Lemna*, a genus of plants, referred by many botanists to the natural order *araceæ*, but regarded by others as the type of a small natural order, *lemnaceæ*, which consists chiefly of floating plants, mere flat green fronds, with roots hanging loosely in the water, and unisexual flowers—destitute of calyx and corolla—bursting through a membranous spathe in their margin.

DUCLERC, CHARLES THÉODORE EUGÈNE, French statesman, was born at Bagnères-de-Bigorre, in 1812. From 1836 to 1846 he was engaged in journalism, and wrote a series of remarkable articles on political economy and finance. The events of 1848 brought him into political life, and he served as minister of finance and in other offices. During 1871–75, he served in the National Assembly, and in 1875 was elected a senator for life. He succeeded de Freycinet as minister in 1882; the attitude of his ministry on the Egyptian question was that of passive protest, and it soon fell. He d. in 1888.

DUCLOS, CHARLES PINEAU, 1704–72; a native of Brittany; writer of romance and history. Among his works were *Acajou and Zirphile*; *The Baroness de Luz*; and *Confessions of the Count de XXX*, all romances; *History of Louis XI.*; *Secret Memoirs of the Reigns of Louis XIV. and XV.*; *Considerations on Italy*, etc. Though living in Paris he was elected mayor of Dinant, and was chosen deputy to the assembly of the states of Brittany. At the request of that body he was granted a patent of nobility.

DUCORNET, LOUIS CÉSAR JOSEPH, 1806–56; a French artist. He was born without arms, and learned to use his feet for hands. Having a talent for painting, he made such excellent drawings with his toes that at the age of 13 he was taken into the academy as a pupil. When but 16 he took the first prize for drawings of the human form, and both the national government and his native city settled pensions upon him. Not only was he without arms, but he had only four toes on each foot, and his lower limbs were far from perfect. In conversation, he gesticulated with his legs. He was expert in painting, and among his best efforts were “Parting of Hector and Andromache,” and “Edith Finding the Body of Harold.”

DUCROT, AUGUSTE ALEXANDRE, b. 1817; a French general, educated at St. Cyr; served in Algeria and Africa, and in 1869 in command of the 6th division quartered at Strasburg. He fought at Sedan, and when MacMahon was wounded, took the chief command. After surrender he refused to accept conditions, escaping to Paris, and took command of the 13th and 14th army corps. He participated in the last disastrous sortie, Jan. 19, 1871. After the fall of Paris he was elected to the national assembly. He published *The Truth about Algeria*; *The Day of Sedan*; and some other works. He d. 1882.

DUCTILITY is that property of bodies by which they are capable of being drawn out in length, while diminishing in breadth, without fracture or separation of their parts. Ductility is peculiarly noticeable in the case of metals. It is possessed also by gums, glues, resins, and some other bodies, which, when softened by water or heat, may be drawn into threads. Clays, when moistened, become ductile. Metals are ductile, generally speaking, at any temperature, but their D. is much influenced by temperature; some—brass, for example—are more ductile at ordinary temperatures than when hot. Metals are ductile nearly in the order of their malleability (q.v.), the order of their D. being as follows, beginning with the highest: gold, silver, platinum, iron, copper, zinc, tin, lead, nickel, palladium, cadmium. Some, however, as iron, are more ductile than malleable. The D. of gold and glass is surprising; see article **DISTENSIBILITY** for an account of the fineness to which gold-gilt, silver wire, and glass tubes have been drawn. The D. of glass at red heat seems to have no limit; at high temperatures, this brittle substance may be drawn into threads finer than any hair, and of the highest flexibility. Its flexibility, indeed, according to some, increases in proportion to the fineness to which its threads are drawn, and it is conceived to be possible that we may yet convert glass into cloths for wearing apparel.

DUDE, a derisive term applied to a foppish man, and first used in the U. S. about 1880. Some would derive the nickname from *duds*, used in the sense of clothes in general. It may, however, have come from the German, inasmuch as Grimm (*Wörterbuch*, 1860) gives the following definition: *Dude*, *ein alberner mensch*; *stupidus*; a stupid man; a blockhead. See **CHIC**; **INCROYABLES**.

DU DEFFAND, MARIE DE VICHY CHAMROND, Marquise, a celebrated Frenchwoman, was b. of a noble family of Burgundy in 1697, and educated at the convent of La Madeleine de Trenelle, in Paris. Here she manifested that boldness of opinion and vivacity of intellect which obtained for her so many distinguished admirers in after-years. Her parents, alarmed at her skepticism, sent the eloquent Massillon to converse with her, who was, however, more struck with the wit and beauty of the young lady, than she was with the force of his arguments. In 1718, she married the marquis Du Deffand. The union was unhappy, and a separation took place, whereupon the marquise threw herself into all the excesses of gallantry which characterized French society in the 18th c., and had the name of being, for a time, the mistress of the regent. Subsequently a reconciliation took place between her and her husband, but it lasted only a short period. She then set up an establishment of her own, and gathered round her all the wits, philosophers, and men of fashion in her day. Among her friends and correspondents may be mentioned D'Alembert, Voltaire, President Hénault, Montesquieu, Marmontel, and

Walpole. Her evening-parties at her residence in the rue St. Dominique were famous. They formed a rendezvous for all the notabilities of Paris, and were much relished by distinguished foreigners visiting the city. In 1753, she became blind, and in the following year chose as companion and reader a young lady, Mlle. de l'Espinasse, of whom, however, she became very jealous, on account of the attentions paid to her by the friends of the marquise. In 1764, the two ladies separated, Mlle. de l'Espinasse carrying with her a large number of enthusiastic partisans, who deserted the saloon in the rue St. Dominique, at the head of whom was D'Alembert. The marquise Du D. died 24 Sept., 1780. Her correspondence with D'Alembert, president Hénault, Montesquieu, and the duchesse du Maine was published in 1809; and in the following year appeared at London her correspondence with Horace Walpole (written between 1766 and 1780), to which were added her letters to Voltaire.

DUDEVANT, AMANTINE LUCILE AURORE, MADAME, a French authoress, who has attained an extraordinary celebrity under the name of **GEORGE SAND**. She was b. at Paris in 1804, and descended by the father's side from the famous marshal de Saxe. Her maiden name was Dupin. After having received a strict conventual education (1817-20), she married M. Dudevant in 1822; but in the course of a few years, finding the lack of congeniality of sentiment intolerable, she arranged a separation with her husband in 1831, and repaired to Paris, where at first she was hard pushed to secure a livelihood. Her first literary efforts made their appearance in the *Figaro*. In conjunction with her friend and companion for the time, Jules Sandeau, from whose name she formed her *nom de plume*, she wrote a romance, entitled *Rose et Blanche* (1832), which only occasionally rises above mediocrity, and gave no hint of the splendid ability first fully developed in *Indiana*, published in the same year. This romance, in which a glowing heart, deeply wounded by the pressure of social relations, gives vent to its feelings, excited considerable interest. This was increased to the utmost by the succeeding romances—*Valentine* (1832); *Lélia* (1833); *Jacques* (1834); *André* (1835); *Leone Leonè* (1835); and *Simon* (1836). During the next two years, she published a great variety of works, in which she showed herself to be deeply influenced by the age in which she was living. In addition to her purely imaginative productions, Madame D. found time to contribute miscellaneous essays and political articles to the journal entitled *Le Monde*, so long as it was edited by Lamennais. She was much occupied at this time with philosophical and theological speculations, and their influence may be traced in the *Spiridion* (1839), and the extraordinary piece of prose poetry, entitled *Les Sept Cordes de la Lyre* (1840). She cherished, moreover, republican ideas of the wildest nature, which appeared conspicuously in the *Compagnon du Tour de France* (1840), and in *Pauline*. Her brilliant literary success having now placed her in comfortable circumstances, she obtained a legal divorce from her husband, and thus secured possession of a portion of the property which she had brought to him as her dowry. She now occupied herself with the education of her two children, and spent her time, sometimes in Paris, sometimes at her estate in Berri, where she had passed her childhood, or in journeys into Switzerland and Italy. A dispute with the editors of the *Revue des Deux Mondes*, which, from 1833 to 1841, had regularly published her works in chapters before they appeared in a separate form, induced her to start the *Revue Indépendante*, in conjunction with P. Leroux and Viardot. For this new review, she wrote *Horace*, *Consuelo*, and *La Comtesse de Rudolstadt* (1842-43), three romances deeply imbued with democratic feelings and sentiments, which are apparent likewise in *Jeanne* (1844), and which in the *Mémoires d'Angibault* (1845), becomes altogether socialistic. It would be impossible to enumerate the works which flowed from her rapid pen between this period and the revolution of 1848. It is sufficient to say, that her socialistic sympathies predominate in all of them; but if the logic is not convincing, the vigor and purity of her imagination are undeniable. This is always the case with Madame Dudevant. Even those who disapprove of her exaggerated and one-sided ideas, and views of life, must admire the perfect form, the captivating style, the plastic finish, and the great affluence of thought and sentiment displayed in all her productions. Her finest romances are *Valentine*, *André*, and, in particular parts, *Consuelo*, which is her best known work. Of her smaller pieces, *La Mare au Diable*, is a masterpiece of its kind, and indeed, considered from an æsthetic point of view, is the most complete production of her pen. After the revolution of Feb., Madame D. for a short time wasted her talents on the barren politics of the day. She subsequently devoted herself to writing plays, which were received less favorably than her novels, though the *Marquis de Villemer*, and one or two more, were very successful. In 1854, she published *Histoire de Ma Vie*; in 1871, *Journal d'un Voyageur pendant la Guerre*; and in 1873, *Impressions et Souvenirs*. Madame D. died on June 8, 1876.

DUDLEY, a parliamentary borough in a detached part of Worcestershire, in the s. of Staffordshire, 26 m. n.e. of Worcester, and 8½ m. w.n.w. of Birmingham. It is a well-built town, and a chief seat of the iron trade. On the n.e. of the town are the beautiful ruins of an old castle, founded in 760 by Dodo, a Saxon prince. It was demolished in the time of the civil wars of Charles I., was rebuilt, but was afterwards burned down in 1750. In the vicinity are iron and coal mines, and limestone quarries. The limestone is Silurian, and full of organic remains; it is wrought out of caverns, and brought

to the kilns through a tunnel one mile and three-quarters long, which is carried through the basalt of the castle hill. Saline springs occur near. The chief manufactures are fire-irons. Pop. par. b., '91, 90,223.

DUDLEY, BENJAMIN WINSLOW, LL.D., 1785-1870; b. Va.: a surgeon, educated in Transylvania and Pennsylvania universities; studied in Europe, and settled in Lexington, Ky. His specialty was lithotomy, or removing stone from the bladder, of which his recorded operations numbered 225, with 6 deaths. He also successfully used ligatures on the carotid artery for aneurism in the skull. He was professor of surgery in the medical school of Transylvania university, which he organized, and which was long the leading medical school in the west; and author of a number of valuable papers.

DUDLEY, CHARLES EDWARD, 1780-1841; a native of England; came to America in 1794; in 1809, married into the Bleecker family of New York, and settled in 1811 at Albany. He was successively state senator, mayor of the city, and U. S. senator to fill the unexpired term of Martin Van Buren, whom Jackson had sent as minister to England. He was greatly interested in astronomical science, and after his death his widow gave \$70,000 for the erection of the observatory at Albany, which bears his name.

DUDLEY, JOSEPH, 1647-1720; b. Mass.; son of Thomas, and also governor of the colony. He studied theology, but went into political life, and from 1677 to 1681, was one of the commissioners of the united colonies. He was at the battle with the Narragansetts in 1675, and one of the commissioners to make peace with that tribe. James II. made him president of New England in 1685; two years later, he was appointed chief-justice, and was arrested as one of the friends of Andros, with whom he was sent to England. In 1690, he was made chief-justice of New York. In 1693, he went to England, and in 1701 was elected to parliament. From 1702 to 1715 he was governor of Massachusetts colony. He was a philosopher, a scholar, a divine, and a lawyer.

DUDLEY, PAUL, 1675-1751; son of Joseph; graduate of Harvard; studied law in London; was commissioned attorney-general of Massachusetts in 1702, promoted to the bench in 1718, and made chief-justice in 1745. He was a member of the legislature, a learned naturalist, and a member of the royal society. He left a legacy to Harvard to establish a yearly lecture in defense of Christianity; and published a number of works, among them one against the church of Rome.

DUDLEY, THOMAS, 1576-1652; a native of England, who came to Massachusetts in 1630 as deputy-governor, and was governor from 1634 to 1640, and again from 1645 to 1650. He had been an officer of the British force in Holland, and retrieved the fortunes of the earl of Lincoln by judicious management of his estates. He was a bold and somewhat intolerant man, but an efficient officer. He died at Roxbury, leaving a large estate. Simon Bradstreet was his son-in-law.

DUDLEY, THOMAS UNDERWOOD, D.D., b. Richmond, Va., 1837; graduated from the univ. of Virginia, 1858; prof. of Latin and Greek in the univ. He was ordained priest in the Prot. Epis. church, 1868; was rector of Christ church, Baltimore, until his elevation to the episcopacy, 1875, when he was appointed assistant bp. of Ky. He became bishop in 1884.

DUDLEY LOCUST, the popular name for a trilobite (*calymena Blumenbachii*, q.v.) which is very abundant in the Dudley limestone.

DUEL (Fr. *duel*, Lat. *duellum* or *dvellum*, which, as Cicero remarks [*Orat.* 45], was the old form of *bellum*, war), a combat between two persons, at a time and place indicated in the challenge, cartel, or defiance borne by one party to the other. A D. generally takes place in the presence of witnesses, called seconds, who regulate the mode of fighting, place the weapons in the hands of the combatants, and enforce compliance with the rules which they have laid down.

No trace of the D., as an institution, is to be found in the history of the classical nations of antiquity, the Latin word from which ours is derived having been used to signify a war between two nations. So long as men continued to be barbarians, their personal quarrels were no doubt decided in the ancient, as national quarrels still are in the modern world, by an appeal to physical force. But though war has been in all times the practical solution of strife, it was not till the middle ages that it came to be regarded as a means, in any sense judicial, of settling disputes. Hitherto, it had determined who was able to prevail, justice being set aside, but it was a new view that it would determine who ought to prevail on the principles of justice. The rationale of the *judicial combat* or *wager of battle* was probably two-fold. On the one hand, and generally amongst the people, it depended on a belief that God would interfere directly and miraculously in the conflict to protect the innocent, and to punish the guilty, and that thus the weakest combatant who had God on his side would prove more than a match for the strongest, when destitute of His aid. But there was a view of the matter which was not so directly superstitious, and which rested rather on a confusion between the principle of the original constitution and the principle of the transmission of rights. All human rights originate in the powers and faculties which God has given to man, and it was supposed that as the right originated in power, its continued existence in

the individual could be ascertained by ascertaining whether the power still existed in him. The error consisted, as we have said, in confounding the principle of the constitution with the principle of the transmission of rights. If a field which was claimed by two competitors had as yet been appropriated to nobody, or had been abandoned, and was, as lawyers say, *res nullius*, the fact of which of the two claimants ought to become the possessor, might be ascertained by judicial combat. But if it was already the property of one of them on a title which was to be held sacred, and the question was which of the two had this sacred title, that fact could never be determined by ascertaining which would have been in a condition to constitute it for the first time, had it been non-existent. The principle of the private D., in so far as it had any principle at all, and was not merely a piece of barbarous and irrational foppery, was precisely the same as that of the judicial combat. But the latter had been applied to a class of cases which admitted of legal investigation and decision, and it was consequently abandoned in the days of Queen Elizabeth; whereas the former was supposed to be a means of redressing wrongs which hardly can come within the cognizance of a human tribunal, and the consequence was that it continued in green observance in this country until recently, and is still in vigor in many continental countries.

Like the other peculiarities of mediæval life, the D. probably originated with the Germanic nations. It is said to have been introduced into legal proceedings in lieu of an oath by Gundebald, king of the Burgundians, in 501. Louis le Débonnaire was the first of the French kings who permitted litigants to appeal to arms. The practice was prohibited by Henry II., in consequence of a noted D. which took place in his presence between his friend, Francis de la Chastaignerie, and Guy Chabot de Jarnac, in which the latter was slain. The royal edict, however, was totally ineffectual, and the practice of private dueling has generally prevailed more extensively in France than in any other country. Francis I. patronized it by declaring that a lie could be borne without satisfaction only by a base-born churl, and still more by the example which he set in challenging his own great rival Charles V. In 1589, the parliament of Paris declared all persons who were either principals or seconds in D. to be rebels to the king. But its efforts were unavailing; and it is said that during the first 18 years of Henry IV., no fewer than 4,000 gentlemen perished in this foolish manner. In 1609, Henry added to the existing penalties, introducing even punishment by death in extreme cases. But these regulations were forced upon him by popular feeling; he had himself no aversion to the practice, and when he gave permission to Crequi to fight Don Philip of Savoy, he added: "If I were not the king, I would be your second." The consequence of this feeling was, that he readily granted pardons to those who had violated the laws which he had been forced to enact, and these laws not unnaturally produced an effect the very reverse of their ostensible object. Dueling acquired the charm of what the French call "forbidden fruit," and thus became a fashionable and favorite vice. In the reign of Louis XIII., the custom was so prevalent, that lord Herbert, the English ambassador, wrote home to his court that there was scarcely a Frenchman worth looking on who had not killed his man. It would not seem, however, that it was from negligence in enforcing the royal edicts that dueling then reached to so alarming a height; for it was during this reign that two noblemen, the greatest duellists of the day, the count de Boutteville and the marquis de Beuron, were tried and beheaded for persisting to fight. In the commencement of the reign of Louis XIV., D. with four or five a side began to be fought; and two very sanguinary affairs of this description having taken place, in which several persons of the highest rank were slain, the king determined to put an end to the practice. He published an edict in 1679, forbidding it under the highest penalties, which, unlike most of his predecessors, he had the firmness to inflict; and this measure, together with a solemn agreement which was entered into amongst the nobility themselves, led at that time to its almost total abolition.

The D. does not seem to have existed in England in Anglo-Saxon times, and was probably introduced at the conquest. In its judicial form, it was not entirely obsolete in the reign of queen Elizabeth; and sir Henry Spelman gives an account of a trial by battle, which terminated, however, without actual combat, in the year 1571. See BATTEL, TRIAL BY. Private dueling was common, however, both in Elizabeth's reign and in that of her successor, by whom a severe statute against it was enacted in Scotland (1600, c. 12). During the civil wars, men's minds were too much occupied with questions of grave importance to leave time for questions of etiquette, and the D. consequently declined; but it became exceedingly prevalent during the dissolute reign of Charles II. Some attempts were made to suppress it in the reign of William III., both in England and Scotland, and, in 1712, the subject was recommended to the attention of parliament in the queen's speech. But the bill which was brought in by the government was thrown out, and the practice continued to prevail. When the custom of wearing the sword was abandoned, the number of duels diminished, though it was then that their irrational character may be said to have attained its maximum. The pistol was substituted for the sword, and the doctrine of chance—which was reduced to an absurdity by the medical D. of a couple of pills, one composed of bread and the other of poison—was inaugurated. Since this period, the practice has fallen into disrepute, by the gradual operation of public opinion, and in this country it may probably be now regarded as finally abolished. By the law of Gr. Britain, the act of killing in a D. has always been

regarded as murder, however fair the D. may have been; but whilst the practice was countenanced by public opinion, it was generally found impossible to induce a jury to convict. That a verdict of acquittal could not be looked for with the same security in the present day, is probably a pretty good guarantee for the practice not again making its appearance even in exceptional instances. In France it still prevails to a certain extent.

The duels of the students at the German universities, of which so much has been said and written in this country, are nothing more than fencing-matches with sharp weapons. They are foolish, but not deadly affairs, as the seconds, who are also armed, always interfere to prevent serious bloodshed.

In 1844, several new articles of war were issued by the commander of the forces, with a view to the abatement of dueling in the English army.

1. Every officer who shall send a challenge, or who shall accept a challenge to fight a D. with another officer, or who, being privy to an intention to fight a D., shall not take active measures to prevent such D., or who shall upbraid another for refusing or not giving a challenge, or who shall reject or advise the rejection of a reasonable proposition made for the honorable adjustment of a difference, shall be liable, if convicted before a general court-martial, to be cashiered, or suffer such other punishment as the court may award.

2. In the event of an officer being brought to a court-martial for having acted as a second in a D., if it appear that such officer exerted himself strenuously to bring about an honorable adjustment of the difference, but failed through the unwillingness of the adverse parties, then such officer is to suffer such punishment as the court shall award.

3. Approbation is expressed of the conduct of those who, having had the misfortune to give offense to, or injure or insult others, shall frankly explain, apologize, or offer redress for the same, or who, having received offense, shall cordially accept frank explanations or apologies for the same; or, if such apologies are refused to be made or accepted, shall submit the matter to the commanding officer; and, lastly, all officers and soldiers are acquitted of disgrace or disadvantage, who, being willing to make or accept such redress, refuse to accept challenges, as they will only have acted as is suitable to the character of honorable men, and have done their duty as good soldiers who subject themselves to discipline.

Partly in consequence of these regulations, but still more as a result of the increasing reason and humanity of English society, the practice of dueling has become almost as entirely obsolete in the British army as it has in the country generally. See ORDEAL.

In the southern portion of the United States the custom of dueling, though of late years falling into disuse, is, to some extent, a recognized institution of society. Half a century ago the pistol and the bowie-knife were as much a part of a man's equipage as his hat or his boots. A gentleman of good social position who had not fought at least one duel was often looked upon as deficient in the qualities proper to his station. Sudden affrays in the streets, stealthy assassinations, and bitter family feuds, were the consequences. These feuds rived in duration and ferocity the Venetian vendetta. The land was full of swaggering bullies who had, metaphorically, in one hand a pack of cards and in the other a pistol. Modern civilization, and more especially the war of the secession, in which the southern states suffered so terribly, have greatly modified this fire-eating spirit. Other influences have assisted. Not only is the general voice against the practice, but in a large number of the states laws have been enacted which pronounce the killing of a fellow-being in a duel to be murder, and in still more states the mere sending of a challenge is a felony. The first duel on record in America was fought June 18, 1621, in New England, between two servants who fought with sword and dagger, and both were wounded. They were sentenced to have their heads and feet tied together, and lie 24 hours without meat or drink. In 1728, one young man killed another on Boston common in a night duel with swords. The survivor escaped from the country, and a severe law against dueling was enacted. During the revolution there were a number of duels. Charles Lee and John Laurens fought, and the former was wounded; Gwynnett, a signer of the declaration of independence was killed by Gen. McIntosh. Gen. Greene was twice challenged, but refused to fight, and Washington approved his refusal. The most notable duel in the country's history was when Alexander Hamilton was slain by Aaron Burr. On that occasion a great man was lost to the nation, and a dangerous demagogue was socially and politically ruined. In the navy the duel in which Decatur was killed and Barron wounded holds the first place. Andrew Jackson killed a man named Dickinson, and was engaged in several other conflicts. Col. Benton killed Lucas, and also had other duels. Henry Clay and John Randolph, the two most brilliant men at that period in congress, fought in 1826. Jonathan Cilley, a member of congress from Maine, was killed by William J. Graves, a member from Kentucky, in 1838. Although himself a duelist, Jackson, while president, expelled officers from the navy for dueling. At the present time a person in the military or naval service implicated in a duel, either as principal or second, may be summarily cashiered. In the northern states the appeal to arms is seldom heard of, though by no means uncommon at the beginning of the century. De Witt Clinton fought with and wounded John Swartwout in 1802, and the next year challenged Gen. Dayton of New

Jersey. One might suppose that journalism was a calling of any other than a warlike nature, but there have been several notable duels between editors. In 1804, James Cheetham, editor of the *American Citizen*, challenged William Coleman, editor of the *New York Evening Post*. The two did not fight, but there was a duel growing out of the challenge between Coleman and a harbor-master named Thompson, and the latter was supposed to have been killed. John D'Oley Burke, an Irishman, author of a drama called *Bunker Hill, or the Death of Warren*, and editor of a paper in New York, was killed in a duel in 1808. In 1846, Thomas Ritchie, jr., and John H. Pleasants, editors of the *Enquirer* and the *Whig* of Richmond, Va., met in a field, armed with swords and pistols, and had a desperate fight, in which Pleasants was killed, Ritchie being only slightly wounded. In 1842, James Watson Webb, editor of the *New York Courier and Enquirer*, fought with Thomas F. Marshall, a member of congress from Kentucky, and Webb was slightly wounded. The number of duels among editors in the southern states is very great. In some of the states the killing of a man in a duel is punishable with death; in others by imprisonment and forfeiture of political rights. In some states certain officers are required to swear that they have not been, within a certain period, and will not be, engaged in a duel.

DUENNA (feminine of "Dueño"), a woman in Spain, something more than a governess, and something less than an equal of the family, having charge of a gentleman's daughters, or being companion to the lady of the house.

DUER, JOHN, LL.D., 1782-1858; b. N. Y.; a distinguished jurist; son of William Duer, a revolutionary patriot whose wife was a daughter of William Alexander, claimant of the earldom of Stirling. Duer studied law, and from 1820 until his death was in practice in New York. In 1825, he was one of the commissioners to revise the laws of the state; in 1849, he was elected justice of the superior court, and in 1857, became chief justice. He published *Duer's Reports*, works on marine insurance, and addresses before the New York historical society.

DUER, WILLIAM ALEXANDER, 1780-1858; b. New York; brother of John. Through his mother he was grandson of lord Stirling. He studied law, and about 1802 became a partner of Edward Livingston, in New Orleans. About 1812, he returned to New York, where from 1822 to 1829, he was a judge of the supreme court. In 1829, he was elected president of Columbia college. He published a *Treatise on the Constitutional Jurisprudence of the United States*.

DUET, in music, a composition for two voices or instruments.

DUFAURE, JULES ARMAND STANISLAS, b. Saujon, France, 1798; studied law in Paris, and in 1834 was chosen deputy from Saintes, and regularly re-elected until 1848. He was councilor of state in 1836, and minister of public affairs in 1839. In 1844, he was chosen vice-president of the chamber, and after the revolution of 1848, was minister of the interior. Louis Napoleon gave him the same office, but after the *coup d'état* he returned to private life. In 1871, he was made minister of justice and vice-president of the council of ministers, but these offices were taken away in 1873. He d. 1881.

DU FAY, CHARLES FRANÇOIS DE CISTERNAY, 1698-1739; b. Paris. He made important researches concerning the barometer, the nature of phosphorus, the refracting power of crystals, electricity, and the magnet. He spent many years in rearranging and improving the garden of plants in Paris.

DUFF, ALEXANDER, D.D., LL.D., who so thoroughly identified himself with the cause of Indian missions, was b. 25th April, 1806, at a farm near Pitlochry, in Perthshire. He studied at the university of St. Andrews with great success. In 1829, he resolved to go out to India as a missionary from the church of Scotland; and in Oct. of that year, having been previously ordained, he set sail from Portsmouth for India. On the passage out, he was wrecked on a barren island to the n. of the cape of Good Hope, and at length reached his destination after a disastrous voyage of eight months. At the disruption in 1843, the missionaries in India being obliged to declare with which party they would connect themselves, D. resolved to cast in his lot with the free church, and for 20 years carried on with great energy the missionary work at Calcutta under the auspices of that body. In the year 1837, he received the degree of D.D., in acknowledgment of his distinguished services. D. visited his native land twice after 1829, before returning altogether in 1863. He was moderator of the general assembly of the free church in 1851 and 1873, and was professor of evangelistic theology in the free church colleges. He took an important part in various philanthropic societies and schemes. Dr. D. was gifted with great fervor and extraordinary fluency as a speaker, and he wrote voluminously. Amongst his writings are, *New Era of the English Language and Literature* (1837); *Missions the Chief End of the Christian Church* (1839); *India and Indian Missions* (1839); *The Indian Rebellion, its Causes and Results* (1858). *The Calcutta Review* was mainly established by Dr. Duff. He died 12th Feb., 1878.

DUFFERIN AND AVA, FREDERICK TEMPLE HAMILTON BLACKWOOD, Marquis of, b. England, 1826; educated at Eton; succeeded his father in 1841 as fifth baron Dufferin and Clandeboyne. He was for some years lord-in-waiting on the queen. During the Irish famine of 1846-47, he traveled in that country, and wrote an account of the wretchedness. In 1855, he was attached to the Austrian mission. In 1859, he made a yacht voyage to

Iceland, an account of which he published in *Letters from High Latitudes*. In 1860, he was sent as British commissioner to Syria to inquire into the massacre of Christians. In 1864, he was under-secretary of state for India, and in 1866, under secretary of war. Gladstone, in 1868, made him chancellor of the duchy of Lancaster; and in 1872, he was appointed gov. gen. of the dominion of Canada, where he had great popularity. In 1876, he made a tour through British Columbia. In 1878, he was superseded by the marquis of Lorne, and was immediately elected president of the royal geographical society. He was made an earl in 1871. He was ambassador to Russia in 1879-81, and to Turkey in 1881-84; viceroy of India, 1884-88; ambassador to Italy in 1888-91; and became ambassador to France in 1891. In 1890 he published his collected speeches. His wife, Harriet Hamilton, is well known for her philanthropic work among the native women of India and for the interesting books, *The Record of Three Years' Work* (1889), and *Our Vice-Regal Life in India* (1890). In 1891 he became lord rector of Glasgow University, and in 1891-5 was lord warden of the Cinque Ports.

DUFFY, Sir CHARLES GAVAN, b. Monaghan, Ire., 1816; in his 20th year became editor of the *Belfast Vindicator*, a prominent Rom. Cath. paper; in 1842, with Thomas Davis and John Dillon, established the *Nation* as the organ of the Young Ireland party. The power wielded by this journal in stimulating opposition to British rule, led the government to include its editors in the indictment for sedition against Daniel O'Connell, 1844. They were convicted, but the House of Lords finally set aside the verdict. Two years later O'Connell quarreled with the Young Ireland party, who thereupon reorganized under the name of the Irish Confederation. With other members of that body, D. was tried for treason felony, 1848, but was acquitted. He then revived the *Nation*; founded the Irish tenant league; was elected to the House of Commons, 1852; established the Independent Irish party; but on account of the opposition of the ultra Rom. Catholics, resigned, 1856, and emigrated to Australia, where he took up the practice of the law. He became minister of public works in Victoria, 1857, entered the parliament there, and was prime minister, 1871. He was knighted, 1868; and, 1877, was elected speaker of the Legislative Assembly. He has published *Ballad Poetry of Ireland*; *Young Ireland: a Fragment of Irish History*, 1840-50; *Four Years of Irish History*, 1845-1849 (1883); *Conversations with Carlyle* (1892), etc.

DUFOUR, GUILLAUME HENRI, a Swiss general, b. at Constance in 1787, of a Genevese family. While Switzerland formed part of France, he studied at the Polytechnic school of Paris for two years; and on leaving it, he received an appointment as an officer of engineers in the French army. At the fall of Napoleon, he entered the Swiss service, and rapidly rose to the rank of col. When the government survey of Switzerland was undertaken, he was appointed director—at the same time acting as the principal of the Swiss military school at Thun. In 1840 he published *A Treatise on the Artillery of Ancient and Mediæval Times*; and in 1842, *A Manual of Military Tactics*. In 1847 he was raised to the rank of gen., and intrusted with the command of the army employed against the Sonderbund. He defeated their forces at Freiburg (13th Nov.) and at Lucerne (24th Nov.); and by his promptitude and skillful manoeuvres, secured a triumph for the liberal party in time to prevent the interference of foreign powers, diplomatically or otherwise. The diet voted him a gift of 40,000 francs, and for a time he was the most popular man in Switzerland. His politics were not, however, those of the Genevese democrats, and in 1848 they deprived him of the public offices he had previously held. In 1856, he was again admitted to the council of Geneva, and sent on a special mission to Louis Napoleon (see KERN, J. CONRAD). He d. in 1875.

BUGDALE, Sir WILLIAM, a celebrated antiquary and historian, was b. in 1605 at Shustoke, near Coleshill, Warwickshire. He was educated for some time at the free school of Coventry, but left it at the age of 15, and continued his studies under the care of his father, who, having a decided predilection for the branches of civil law and history, seems to have encouraged similar tastes in his son. His antiquarian pursuits led to his being created (1638) a pursuivant-at-arms extraordinary by the name of Blanche Lyon; and shortly afterwards, he was made Rouge Croix pursuivant-in-ordinary. During the civil war, D. adhered to the royal cause, and lived for several years in Oxford, employed in researches for his great works. On the restoration, D. was made Norroy king of arms, and in 1677 Garter king of arms; at the same time, the king, much against the wishes of D., whose estate was but a poor one, conferred upon him the honor of knighthood. He died at his estate of Blythe hall, Feb. 10, 1686. His chief works are *Monasticon Anglicanum* (Lond. 1655-61-73), (which, though for the most part written by another antiquary, named Dodsworth, was concluded, arranged, indexed, and corrected by D.); a new and greatly enlarged edition of the *Monasticon* by Bandler, Caley, and Ellis, was published in 1817-30, and reissued in 1846; *The Antiquities of Warwickshire* (1656; second edition revised and continued, 1730); *The Baronage of England* (1675-76); *Origines Juridicales, or Historical Memoirs of the English Laws*, etc. (1666; third edit. 1680); *Short View of the Late Troubles in England* (Oxford, 1681); *The Ancient Usage in Bearing Arms* (1683; new edition, 1811). D. bequeathed upwards of

27 folio MS. volumes, written in his own hand, to the university of Oxford. They are now in the Bodleian library, the Herald's college, and the Ashmolean museum.

DUGONG', *Halicore*, a genus of mammalia, of the family *manatiæ* (q. v.), or herbivorous cetacea, distinguished by molar teeth with flat summits, and composed of two cones laterally united, the incisors of the upper jaw elongated almost into tusks; the tail forked or crescent-shaped; and the swimming paws destitute of any vestiges of nails. One species alone has been thoroughly ascertained and accurately described. The *D. (H. indicus, or H. dugong)* of the Indian archipelago is said to attain a length of 20 ft. when full grown, although it is more frequently seen of only 8 to 12 ft. long. In general form, it much resembles the manatee. The skull is remarkable for the sudden bending downwards of the upper jaw almost at a right angle. The upper lip is large, thick, and fleshy, covering the prominent incisors, and forming a kind of snout, "something like the trunk of the elephant cut short across." The eyes are very small, and are furnished with a third eyelid or *nictitating membrane*. The skin is smooth and thick, but yields no oil. The anatomy of the *D.* has been very carefully examined. It exhibits a very remarkable peculiarity, in the ventricles of the heart being completely detached from one another. Its osteology has been found to exhibit interesting points of correspondence with that of the *pachydermata*, as in the numerous ribs, etc.; its dentition resembles in some particulars that of the elephant; its digestive apparatus is adapted to vegetable food, differing very much from that of the whales, dolphins, and other ordinary cetaceans. It feeds on the algæ which grow on submarine rocks in shallow seas. Its lips are of much use in gathering together its food. It often comes to the surface to breathe, and is said to utter a peculiar cry. It is gregarious. The female produces one young one at a birth, and shows an affection for it which is proverbial among the Malays. When the young one is taken, the mother is easily secured. The *D.* is generally pursued in boats, and killed by spearing. The flesh is highly esteemed even by Europeans, and is described as resembling young beef. That of full-grown animals is, however, comparatively coarse, on which account, and the greater facility of capture, the younger ones are more frequently killed. According to Rüppell, it was with the skin of the *D.* of the Red sea that the Jews were directed to veil the tabernacle.

DUGUAY TROUIN, RENÉ, one of the most celebrated naval officers of France, was b. 10th June, 1673, at St. Malo, left the school at Caen, where he was to have studied theology, with the reputation of a good-for-nothing fellow, and betook himself to the sea. His career, which was very brilliant, may be divided into two parts, the first extending from 1689 to 1697, and the second from 1697 to the close of his life. During the former, he cruised about as a sort of privateer, inflicting immense damage on the enemies of France. The English merchantmen suffered severely from his attacks. In the channel, on the coasts of Ireland and Holland, in the Spanish Main, everywhere fortune followed Duguay. Louis XIV., as a reward for his daring exploits, admitted him into the state navy, and gave him the command of a frigate. The second part of his career was as brilliant as the first. In 1707, he engaged a part of the English fleet at the entrance of the channel, burned 1 ship, captured 3 others and about 60 transports; but the most glorious of his triumphs was the attack and capture of Rio Janeiro in 1711, after hostilities had lasted for 11 days. The city was ransomed for 610,000 cruzades. The South American expedition of D. T., which cost Portugal in all about 30,000,000 francs, put the seal to the celebrity of the French commander. He was successively named *chef d'escadre*, member of the council of the Indies, lieutenant-gen., and naval commandant at Brest. In 1731, Louis XV. sent D. T. into the Levant, to chastise the barbarians inhabiting the neighboring coasts, and to obtain reparation for the damages done to French commerce. In this also D. T. was successful. He died 27th Sept., 1736. His *Mémoires* were published by Beauchamps (4 vols., Paris, 1740).

DU GUESCLIN, BERTRAND, 1314-80; constable of France, and the most famous French soldier of the age. He was so remarkable for ugliness, when a child, as to be an object of aversion to his parents. He gained his first reputation as a soldier in 1338 at a tournament to celebrate the marriage of Charles of Blois with Jeanne de Penthièvre, at which he unseated all the famous competitors. Becoming a soldier of fortune under Charles, he gained great distinction at the siege of Vannes in 1342. He was knighted, and in 1351 went, with the lords of Brittany, to England to secure the release of his captive master. He gallantly relieved Rennes, besieged by the duke of Lancaster in 1356, and by his help the city held out till the truce of Bordeaux in June, 1357. He soon took service under the French king, and, after several brilliant actions, was made marshal of Normandy and count of Longueville. At the battle of Auray, in 1364, he was taken prisoner, but he was ransomed for 100,000 crowns; and becoming commander of the grand companies, led them into Spain, where he placed Henry of Trastamare on the throne of Castile in 1366. In the next year he was taken prisoner by the Black Prince, then in alliance with Pedro the Cruel. Being again ransomed, he again restored Henry to the throne in 1369. In 1370, he was made constable of France, and for ten years was active and successful in driving the English from the s. and w. of France. In 1373, he seized and held the duchy of Brittany. He died while besieging the fortress of Châteauneuf-Randon. The garrison had already agreed to capitulate, and their commander led them out, and placed the keys of the castle upon the coffin of the constable.

DUHAMEL, JOSEPH, Canadian barrister, was b. Montreal, 1836. He was educated at the Jesuits' College, Montreal, and was admitted to the bar in 1857. He soon became one of the foremost advocates in Canada, winning a wide reputation as a profound lawyer and eloquent orator.

DUHAMEL, JOSEPH THOMAS, was born in Contrecoeur, Verchères co., Canada, in 1841, was prepared for the priesthood by the Oblate fathers, and ordained in 1863. In 1869 he went to the Vatican. He was made bishop of Ottawa in 1874, and spent much time in the development of the college of Ottawa. He was made a count of the holy Roman empire in 1872 and was created first archbishop of Ottawa in 1886.

DUHAMEL DU MONCEAU, HENRI LOUIS, 1700-82; a French botanist. For discovering the disease which was destroying the saffron plant (a parasitical fungus attacking the roots), he was made a member of the academy of sciences. Alone, and with Buffon, he made many experiments in vegetable and animal physiology, and the influence of the weather on agricultural production. Late in life he was appointed inspector-general of marine.

DUILLIAN COLUMN, erected in the forum at Rome in honor of the naval victory of C. Duilius. The name *rostrate* was given to columns commemorating naval victories (from *rostra* the beak of a ship), as they had on each side projections in the form of such beaks. Michael Angelo restored this column, and his restoration is in the Palazzo de' Conservatori, on the Capitoline hill. Its pedestal retains a portion of the original inscription.

DUISBURG, a t. of Rhenish Prussia, about 15 m. n. of Düsseldorf, is situated in a fertile district, between the Ruhr and the Rhine, with both of which it is connected by a canal. It is surrounded partly by walls, flanked with towers, which are now somewhat decayed, and partly by a rampart and ditches. D. contains a gymnasium founded in 1599, a monastery of Minorites, and five churches, two of which—that of St. John the Baptist, dating from 1187, and St. Salvador's, are worthy of notice. Its manufactures are numerous and important; including tobacco, soda, sulphuric acid, and other chemicals, iron castings, soap, starch, and sugar; there is also a large trade in wine and colonial produce. In the neighborhood are iron-works and coal-mines. Pop. '95, 70,287. D. is an ancient town. In the 13th c., it was a member of the Hanseatic league, and afterwards a free town of the German empire, but at the close of the war in 1815 it was handed over to Prussia.

DUKE (Fr. *duc*, Lat. *dux*, from *ducere*, to lead), a term applied originally to any military leader. Gibbon informs us that the title came first into use when Constantine separated the civil and the military commands in the provinces, which had been exercised in common by such men as Agricola. From that time forth, the military governors of provinces were either counts or dukes. But these titles originally stood to each other in an opposite relation to that which they afterwards assumed. "It should be recollected," says Gibbon (iii. 57, cap. xvii), "that the second of these appellations—that of D.—is only a corruption of the Latin word, which was indiscriminately applied to any military chief. All provincial generals were therefore *dukes*, but no more than ten among them were dignified with the rank of *counts*, or companions, a title of honor, or rather of favor, which had been recently invented in the court of Constantine." See COUNT. "A gold belt," continues Gibbon, "was the ensign which distinguished the office of the counts and dukes; and, besides their pay, they received a liberal allowance, sufficient to maintain 190 servants and 158 horses. They were strictly prohibited from interfering in any matter which related to the administration of justice or the revenue; and the command which they exercised over the troops of their department, was independent of the authority of the magistrates." When the Goths, and Franks, and other barbarians successfully invaded the provinces of the empire, they preserved the titles of count and D., if they had not already borrowed them from the Romans. But amongst races who owed their supremacy to the sword, no dignity could prevail over that of the commander of an army; and the dukes, as military chiefs, acquired a marked pre-eminence over the counts, whose lofty functions under the empire had been partly of a civil, and partly of a military nature. The only exception under the first Merovingians was in the case of the count of the palace. See COUNT. In the hierarchy observed by the Franks and other Teutonic races, the ordinary count became the lieutenant of the D., and the government of the latter extended to several provinces; whereas that of the former was confined to one province, or even to a single locality. The power of the dukes grew so rapidly, in consequence of the dissensions of the Merovingians, that, towards the end of the 6th c. (582), they arrogated to themselves the right to dispose of the crown. Amongst the causes which tended to raise the power of the dukes, was the immense wealth which had been acquired by the great provincial families. The chiefs who had attached themselves to the fortunes of Clovis had been richly endowed with conquered lands. After the close of the 7th c., they overshadowed the crown, and the title of prince and chief (*chef*) began to be attributed to them. It has been said that the *ducs-maires* of the palace sometimes assumed the title of archduke (q.v.). Under the second dynasty, the title of duke retained all its dignity and importance, and it was to the successive invasions of local upon central power, that feudality owed its origin.

The concession, tacit or express, of hereditary power and independent jurisdiction, first to the central province known as the Isle of France, and then to Aquitaine, extended itself, under the Carolingians, to Burgundy, Normandy, and Gascony; and on the accession of Hugo Capet, to all the other subaltern tenures. Once become unlimited masters of their respective legations, the dukes did not long delay to proclaim their title to be as good as that of the king. They assumed the crown and the scepter, promulgated laws for their subjects, struck money with their own image, and made war in their own name against the crown, with whom they balanced and several times divided the supreme authority. The confederation of the feudal lords had assumed such dimensions, that about the period of the Norman invasion of England nothing remained directly under the crown except a few towns, of which Rheims and Laon were the chief. The rest of the kingdom was divided amongst the dukes and the counts, under an obligation, which they almost always evaded, of service and fidelity to the crown. But the Capetians had been enlightened by the fall of two dynasties, and were careful to delegate to no other hands the duchy of the Isle of France, which had so often been a stepping stone to the throne. When it became extinct in 887, it was not re-established, and that event was the signal for the restoration of a national character to France. The duchy of Gascony was joined to Aquitaine in 1052; and both provinces, along with Normandy, were finally re-united to the crown, in 1204, by confiscation. This latter duchy was sometimes given to princes of the blood, but without any separation of its fiscal arrangements from those of the kingdom. A part of Aquitaine was given up to England in 1259, and again ceded to France in 1453. The ducal sovereignty of Burgundy was extinguished in 1477, that of Brittany in 1514, of Narbonne in 1229, and of Toulouse in 1361.

The duchies which were subsequently granted to members of the royal family—that of Bourbon, erected in 1327; of Orleans, in 1344; of Auvergne, Berri, Touraine, Valois, and Alençon, at subsequent periods—enjoyed none of the privileges of independent sovereignty which had belonged to the ancient duchies. The subordination of these fiefs was absolute, and the princes who governed them, though placed on the steps of the throne, were only the first subjects of the realm. The tendency to diminish the actual power which anciently had attached to the ducal title, was still more apparent in the case of those dukedoms which were conferred on the representatives of illustrious noble families. The Montmorencies were created dukes in 1551, but they enjoyed no other privileges than those of titled nobles, and their position had no analogy whatever to that of the old provincial dukes. The duke-peers, as they were called, were simply the first class of nobles in France, just as dukes are with us in England; but they differed from English dukes, in that, after the extinction of the Comté Pairie d'Eu, in 1775, the duke-peers alone sat in parliament. Several prelates enjoyed this rank—as, for example, the archbishop-duke of Rheims, the bishop-duke of Laon, and the bishop-duke of Langres. The archbishop of Paris took the same rank after the erection of St. Cloud into a ducal peerage in 1674. There were still two other sorts of dukes in France—the dukes who were not hereditary peers, and the dukes for life, or patent dukes, who date only from the reign of Louis XIV. Swept away by the revolution, the title was restored by Napoleon, who conferred it, with rich endowments, on his marshals. Several ducal peers were created by Louis XVIII. and Charles X.

In Germany, the dukedom passed through phases very similar to those which it exhibited in the earlier history of France. What is special to the position of the nobility of that country, will be stated under *GRAF* (q.v.).

Dukes, in the older European sense, do not appear ever to have existed in England. The title seems not to have been known earlier than the reign of Edward III., and from the first it was a mere honorary distinction. The Black Prince, who was created D. of Cornwall (see below) in 1335, was the first English duke. In 1350, Henry, the king's cousin, was created D. of Lancaster; and when he died, and his daughter was married to John of Gaunt, the king's son, the title was transferred to him—his elder brother, Lionel, being made D. of Clarence. In the succeeding reign—that of Richard II.—the two younger sons of Edward III. were created, the one D. of York, and the other D. of Gloucester. The dignity was thus, in the first instance, confined to the royal house. But the families of Holland and Mowbray very soon received the same title; and one of the Beauforts, an illegitimate son of John of Gaunt, was raised to the peerage by the title of D. of Exeter. In the reign of Henry VI., the title was granted more widely, and there were at one time ten duchesses in his court. The Staffords, Beauchamps, and De la Poles, belong to this period. King Henry VIII. created only two dukes—the one was his illegitimate son, whom he made D. of Richmond; and the other Charles Brandon, who married his sister, the French queen, and was made D. of Suffolk. Queen Elizabeth found only one D. when she came to the throne—Thomas Howard, D. of Norfolk—attainder or failure of male issue having extinguished the rest of them. After the attainder and execution of the D. of Norfolk, there was no D. in England, except the king's sons, till Ludovic Stuart, a relative of the king's, was made D. of Richmond in 1623. In 1623, Villiers was made D. of Buckingham. On the restoration, Charles II. restored the Seymours to the rank of dukes of Somerset, and created Monk D. of Albemarle. But the habit of conferring this dignity on the illegitimate sons of

the monarch was still adhered to, as in the case of the D. of Monmouth, who was the illegitimate son of Charles II.; and the D. of Berwick, of James II. Of the existing dukes besides the descendants of Charles II., there are only three families which date their dukedoms before the revolution—viz., the Howards, the Seymours, and the Somersets. It was William and Anne who, by advancing a very considerable number of the first families of peers to the rank of D., altogether changed its character. There are now 11 English dukes, 7 Scotch, 5 of Great Britain, 6 of the United Kingdom, and 2 Irish. These numbers do not include dukes of the blood-royal.

The DUCAL CORONET is composed of a circle of gold, with eight strawberry or parsley leaves, of equal height above the rim.

DUKE OF CORNWALL. The duchy of Cornwall was by royal charter of Edward III. conferred on his son Edward the black prince. King Henry IV. subsequently included the D. of C. in a patent in favor of his son Henry prince of Wales. But since that time, the duchy has belonged of right, without any special grant, to the king's heir-apparent from the time of his birth. On the death of the king's eldest son without issue, during the life of his father, the duchy descends to the next brother. In the event of the death of the heir-apparent without issue, and without leaving a younger brother, or in case the heir-apparent succeeding to the crown, the duchy of Cornwall merges in the crown until the birth of a son calls it again into existence. The uncertainty thus arising in regard to the duchy has produced much confusion in regard to leases held of the D., and various acts of parliament have been passed, from the 21 James I. to the reign of the present queen, to regulate this matter. The D. of C. formerly possessed "royal jurisdiction and crown rights, giving liberty to send burgesses to parliament, and appointing the sheriffs, admirals, and other officers."—Carew's *Cornwall*. At the present day, there is a separate chancellor, and attorney and solicitor general for the D. of Cornwall. The revenues of the duchy are considerable, arising partly from the rents, etc., of the different manors, and partly from the dues on tin, which is produced in large quantities from the Cornish mines. There is a special court for the settlement of questions arising among the miners, called the stannaries court (q.v.). See STANNARIES.

DUKE OF EXETER'S DAUGHTER, an instrument of torture resembling a rack, said to have been invented by the dukes of Exeter and Suffolk during the reign of Henry VI. This curious instrument was for some time preserved in the tower of London. Blackstone avers that it was never put into use.

DUKES, a co. of s.e. Massachusetts, consisting wholly of islands in the Atlantic ocean; in all, about 124 sq.m.; pop. '90, 4369. Martha's Vineyard is the largest island, and is about 5 m. from the mainland. There is some agriculture, but the chief business is fishing and commerce. Co. seat, Edgartown.

DUKE OF YORK'S SCHOOL is the popular designation for the *Royal Military Asylum* at Chelsea. In the French army, there have long been *enfants de troupe* borne on the books of each company or battalion of soldiers; that is, children of deceased soldiers, unprovided with other homes. In England, no such system prevails. The late duke of York, in the year 1801, used his influence to obtain the formation of a soldiers' orphan asylum. Accommodation was obtained at Chelsea; and in 1803, schools were opened for 700 boys and 300 girls, children of deceased soldiers. The institution has been kept up ever since for the boys, of whom 500 are now maintained, but was a failure as to the girls. The boys are wholly supported as well as educated. They are not bound to serve the state after they leave the asylum; but most of them nevertheless enter the army. A soldier's son has not a *right* of admission; a selection is made according as vacancies may occur. When the boys leave the school, those who do not enter the army are apprenticed to trades. The asylum is under a board of commissioners, who make the necessary rules and regulations. The chief officers are the commandant, secretary, quartermaster, head-master, chaplain, surgeon, and dispenser.

The expenses are defrayed by an annual parliamentary grant, included in the army estimates.

No provision is now made by the state for the *daughters* of deceased soldiers. The girls admitted into the asylum in the early years of its history, brought discredit to it by their after-life; and this part of the system was abandoned. There is only a royal patriotic fund asylum on Wandsworth Common, unaided by the state, for soldiers' orphan daughters; it originated during the Crimean war.

DUKINFIELD, a township in the n.e. of Cheshire, 42 m. from Chester, and separated from Ashton-under-Line in Lancashire by the Tame. It has large cotton-factories, iron-foundries, fire-brick and tile-works, and collieries. The township contains one of the deepest coal-mines in the world. Pop. '81, 16,943; '91, 17,408.

DULCAMA'RA, the young branches of the bitter-sweet or woody night-shade (*solanum dulcamara*), a perennial plant of the order solanacæ. The dried branches, sold by the druggists, contain an alkaloid, solanine, besides a sweet and bitter principle, dulcamarine or picroglycion, and other matters. It is feebly narcotic, with power to increase the secretions, particularly of the kidneys and skin. It sometimes produces a dark purple color of the face and hands, with languid circulation of the blood.

DULCIGNO, a t. and seaport of European Turkey till 1880; now in Montenegro, on the shore of the Adriatic, 15 m. s.s.w. of Scutari. The inhabitants were long notorious for piracy, but are now more creditably engaged in the oil and coasting trade. D. is the seat of a Catholic bishop. Pop. about 7,000.

DULCIMER, a musical instrument resembling a flat box, with sounding-board and bridges, strung with thin wire, and played on by striking the wires with a small piece of wood in each hand.

DULONG, PIERRE LOUIS, 1785-1838; b. Rouen, France. His attention was given chiefly to natural sciences, and he made many valuable and some dangerous experiments in chemistry, losing a finger and an eye in his search for knowledge. He investigated the phenomena of animal heat, in company with Berzelius and Berthollet. With Arago he studied several years the elastic power of steam at different temperatures, trying to find preventives of steam-boiler explosions.

DULSE, *Rhodomenia palmata*, a sea-weed, one of the *ceramiaceæ* (q. v.), growing on rocks in the sea, and used as food by the poor on the coasts of Scotland, Ireland, and other northern countries, and of the Grecian archipelago, occasionally also as a luxury by some of the wealthier classes who have acquired a taste for it. It has a purple, leathery, or somewhat membranous, veinless, sessile frond, irregularly cut, with repeatedly forked segments, which are either entire at the edges, or furnished with lateral leaflets, the spores distributed in cloud-like spots over the whole frond. The name D. is also given in the s.w. of England to another sea-weed *iridea edulis*, also one of the *ceramiaceæ*, which has an undivided, obovate or wedge-shaped, flat, expanded frond, very succulent, tapering to a short stalk, and of a dull purple color. It is occasionally employed as food both in the s.w. of England and in Scotland. **PEPPER DULSE**, *Laurentia pinnatifida*, another of the *ceramiaceæ*, has a compressed cartilaginous frond, twice or thrice pinnatifid. It has a pungent taste, and is used as a condiment when other sea-weeds are eaten.

DULUTH, city, port of entry, and co. seat of St. Louis co., Minn.; at the mouth of St. Louis river, and at the western extremity of lake Superior; 165 miles n. of St. Paul; area, 67.25 sq. miles. It was named after Capt. Jean Du Luth, a French traveler, who built a hut here in 1760; was settled on the part known as Minnesota Point; was chartered as a city in 1869, and was subsequently enlarged by the annexation of the suburbs of Lake Side and West Duluth. The city is especially favored with facilities for transportation by rail and water. It is on the Chicago, St. Paul, Minneapolis, and Omaha, the Duluth, and Iron Range, the Duluth and Winnipeg, the Duluth, Mesabe, and Northern, the Duluth, South Shore, and Atlantic, the Duluth Transfer, the Great Northern, the Northern Pacific, and the St. Paul and Duluth railroads. It has an excellent double harbor, the outer one being protected by a breakwater built by the U. S. government, and the inner one by the strip known as Minnesota Point. The inner harbor is entered through a ship canal, and between Minnesota and Rice's points is a dyke with a passage for vessels, which protects the bay from the obstructions of the entrance channel. The U. S. government has adopted plans for greatly improving the harbor, which will make it nearly 10,000 feet long by about 2,000 feet wide, and provide a dock front on the inner harbor and St. Louis bay of about 100 miles. The port is connected by several lines of steamers with all important points on the great lakes, and has a large and steadily increasing commerce in grain, iron ore, coal, lumber, and other commodities of the region. Its trade by water is largely facilitated by the Sault Ste. Marie canal, whose traffic now greatly exceeds that of the Suez canal, and the city has gained third place among the ports of the United States in the number of entrances and clearances of vessels. Duluth is the seat of a Protestant Episcopal and a Roman Catholic bishop; contains over 50 churches, and has St. Luke's, St. Mary's, the Women's, and several private hospitals, central high school (cost \$350,000), more than 30 other public school buildings, several convents and parochial schools, a state normal school, and public, law, and school libraries. There are gas and electric light plants, electric street railroads, a magnificent boulevard on the hill back of the residence portion, numerous parks and lake drives, water-works supplied from the lake with large reservoirs, national and state banks, and a large number of daily and weekly periodicals. While the city is a great commercial centre, it also has important manufacturing interests, using a capital of over \$5,000,000, and having an output valued at over \$9,000,000. Its docks, especially those for handling iron ore, coal, and grain, are among the largest in the world. Pop. '90, 33,115.

DULWICH, a suburb of London, in the n.e. of Surrey, $4\frac{1}{2}$ m. s.s.e. of St. Paul's cathedral, and near Sydenham. It is a fine rural spot, has many genteel residences, and is noted for its college and picture-gallery.

DULWICH COLLEGE, or God's gift, was founded in 1619 by Edward Alleyne, a tragic actor. It maintains a large number of poor brethren and sisters and foundation scholars. In 1870 it was removed to a new building. The age limits of the scholars are 10 and 19 years. A considerable sum is applied to scholarships, which are competed for in open examination.

DUMAS, ALEXANDRE, a French novelist, was the son of the republican general, Alexandre Davy-Dumas, who was himself the offspring of the marquis Davy de la Pailleterie and a negress. The crisp hair and thick lips of D. bore testimony to his African origin, a testimony which is confirmed by the savage voluptuousness and barbaric taste displayed in many of his compositions. D. was born at Villers-Cotterets, 24th July, 1803. His father died when he was quite a child, and he received in consequence a very imperfect education. At the age of 20, he came to Paris to seek his fortune, and after a short time received an appointment in the household of the duc d'Orleans. In 1826, he first appeared as an author in a volume of *Nouvelles*; but it was not till 1829, when his historical drama, *Henri III. et sa Cour*, was brought upon the stage, that France fairly mistook him for a genius. This work appeared at the time when *romanticism* was beginning to triumph over *classicism* in French poetic literature, and was hailed by the advocates of the former as a crowning victory. The duc d'Orleans, who was delighted with the production, led the applause, on the first night of its representation, in honor of the author. Next morning, D. was made librarian to his highness. From this period, he became more and more a noted character in Paris, dexterously contriving at once to feast the appetites of the mob, and to continue the companion of princes. In 1846, he accompanied the duc de Montpensier to Spain, as the historiographer of his marriage. Afterwards, he visited Africa; and on his return to Paris, finding his income inadequate to meet the expenses of his costly mode of life, he opened a theater of his own. The revolution induced him to attempt a political career; but France, in spite of its discreditable admiration of this literary Cagliostro, had sufficient good sense to turn the cold shoulder to him. In 1853, "financial considerations" compelled him to seek refuge in Belgium. Subsequently, his pecuniary star being once more in the ascendant, D. visited the east. After the conquest of Sicily by Garibaldi in 1860, he followed in the wake of the great liberator, who does not seem, however, to have been imposed upon by his mountebank worship and bombastic enthusiasm.

It would require pages to enumerate all the productions which have been issued under the name of D.; but for two reasons, this is unnecessary: first, they are for the most part worthless, and second, they are for the most part not *his*. M. Alphonse Karr, in his *Mercantilisme Littéraire* (1845), and M. Eugène de Mirecourt, in his *Fabrique de Romans, Maison A. Dumas et C^{ie}* (1845), have exposed the astounding quackery of this writer. It would seem that D. had introduced the *sweating-system* into literature, for he had in his employment a large number of poor authors and literary hacks, whose circumstances or position hindered them from demanding a legitimate emolument for their labor. To these persons, D. was in the habit of giving a few brief outlines of a novel or drama, and then paid them for composing the work, which appeared as the production of D.'s miraculous pen. Thus it happened that D. sometimes contrived to issue more volumes in a year than it was possible for a human being to transcribe in the same period. His best known works are *Les Trois Mousquetaires* (8 vols., 1844), *Le Comte de Monte Cristo* (12 vols., 1841-45), *La Reine Margot* (6 vols., 1845). His *Mémoires*, commenced in 1852, only confirm the impression of his character which one derives from the perusal of his books. Altogether, it may be said that the appearance in literature of a writer like D. is a portentous phenomenon; and the avidity with which his immoral fictions are devoured, is the most severe condemnation of modern, and especially French, society that could well be pronounced. He died 5th Dec., 1870.

DUMAS, ALEXANDRE, known as **DUMAS THE YOUNGER**, or **DUMAS FILS** (1824-95), the son of the preceding, was b. in Paris, and began to write at an early age, publishing a book of poems, in 1847, which had little merit. After accompanying his father in his travels, he published *Aventures de Quatre Femmes et d'un Perroquet* (1847), and *La Dame aux Camélias* (1848). The last has continued the best known of all his works. Like most of Dumas' writings it is a novel with a purpose, the object being to show the possibility of the persistence of a pure love in a member of the *demi-monde*. Subsequently dramatized, it has become one of the most popular plays on the stage, retaining its interest to the present time. Sara Bernhardt and Eleanora Duse are among the actresses who have appeared in its title rôle. D. wrote afterwards many plays, most of which present some radical theory of life or society, or deal with some psychological problem. They are all characterized by brilliant dialogue, clever situations, and a certain sensational mode of treatment, which has constituted alike their attraction and their defect. They always deal with the men and women of the present day. The dramatic construction is simple, and there is often no change of scenery from the beginning of the play to the end. The characters are real, but the wit and eloquence of the author make them speak in a manner most unlike that ordinarily heard in society. There is a rigorous logic in the development of the plot, and the conclusion seems inevitable. Among the best known of these plays are *Le Demi-Monde* (1855); *Le Fils Naturel* (1856); *Les Idées de Mme. Aubray* (1867); *Visite de Noces* (1871); *Monsieur Alphonse* (1877); *L'Étrangère* (1876); *Denise* (1885); *Francillon* (1887). He was elected to the French Academy in 1874, and made a commander of the Legion of Honor in 1888.

DUMAS, JEAN BAPTISTE, a distinguished French chemist, was b. at Alais, in the department of Gard, in 1800. He was at first apprenticed to an apothecary in Geneva, and engaged in some scientific investigations that attracted the attention of Decandolle and Prévost. In 1821 he went to Paris, and was appointed chemical *répétiteur* (tutor) in the polytechnic school, and then professor of chemistry in the athénæum. He was

afterwards removed to the Sorbonne, and made a member of the institute. His researches in organic chemistry, on atomic weights, sulphuric ether, and the law of "substitutions," attracted attention over all Europe. D. is not merely an expert chemist, but an able and bold thinker, and eloquent expounder, who has the art of making science attractive, and of captivating his hearers. During the July monarchy, he was a member of the council of education. After the revolution of Feb., he was chosen a member of the legislative assembly; and from 1849 to 1851, he held the portfolio of agriculture and commerce. After the *coup d'état*, he was made a member of the senate and of the superior council of public instruction, (see a sketch of his life in *Nature*, 1880). Numerous contributions from his pen are contained in the *Annales de l'Industrie* and other scientific journals, and in the *Mémoires de l'Académie*. His chief works are *Traité de Chimie appliquée aux Arts*; *Leçons sur la Philosophie Chimique*; *Essai sur la Statique Chimique des Êtres Organisés*, etc. D. delivered the first Faraday lecture before the London Chemical Society, in 1869. He was elected a member of the French Academy in 1876. He d. in 1884.

DUMAS, MATTHIEU, Count, 1753-1837; a French soldier and military historian. He entered upon active service in the army in 1780 as aid to Rochambeau, commander of the French force sent to the aid of the Americans then in revolt against England. He was in a number of engagements, including the capture of Yorktown. After peace, he returned to France. In the revolution of 1789, he acted with Lafayette and the constitutional liberal party. In 1791, he was elected to the assembly, and the next year was chosen president of that body. During the reign of terror he absented himself from France, with some brief intervals. In 1797, he was proscribed as a monarchist, and fled to Holstein. When Bonaparte became first consul he was recalled, and appointed chief of staff to the army of Dijon. He was subsequently counselor of state, and grand officer of the Legion of Honor, whose organization he defended before the Corps Législatif. He went with Joseph Bonaparte to Naples, and was made minister of war. In 1808-9, he served in the French army in Spain and Germany, and after the battle of Wagram he was employed in negotiating the armistice. He was intendant-general of the army in the Russian campaign, an office which involved the charge of the entire administrative department. He shared the horrors of the retreat from Moscow, took part in the battles of Lutzen and Brantzen, and after the defeat at Leipsic was employed to negotiate the capitulation; but his terms were not accepted by the allied powers, and he was arrested and imprisoned until the conclusion of peace in 1814. He was in favor under the temporary restoration, and held important commissions. When Napoleon returned from Elba, Dumas was intrusted with the organizing of the national guards. This put him out of favor with the Bourbons, and when Louis XVIII. was finally restored, he was obliged to retire on half-pay. He then finished his review of military events, in 19 vols., embracing the history of the war from 1798 to 1807. In 1818, he was restored to favor, and made a member of the council of state; in 1828, he was a deputy in the assembly from Paris. After the events of 1830, he was made a peer, and re-entered the council of state as president of the war committee.

DU MAURIER, GEORGE LOUIS PALMELLA BUSSON, b. Paris, 1834. His parents were English though his father was of French descent. He went to England at the age of 17 years, studied chemistry, but returned to Paris and entered the studio of the artist Gleyre. He was employed as a draughtsman on several of the English illustrated monthlies; illustrated *Henry Esmond*, Black's *Three Feathers*, and other books; but is best known by the social caricatures which he has contributed to *Punch*. He contributed a monthly drawing to *Harper's Magazine*, and wrote (1891) a novel, *Peter Ibbetson*, of much originality and power, followed in 1893-94 by *Triby*, which had a most extraordinary circulation, especially in the United States, and the *Martian*, 1897. He d. in 1896.

DUMB. See DEAF AND DUMB.

DUMB AGUE, a common name, although not unscientific, of masked ague, or a form of intermittent fever, in which the prominent symptoms, as the shaking chill, and the succeeding violent fever, are not present, or the tendency to them only slightly indicated. It is sometimes applied, though erroneously, to a much more serious and dangerous form, called pernicious, malignant, or congestive intermittent fever. See INTERMITTENT FEVER.

DUMBARTON, a royal, parliamentary, and municipal burgh, seaport, and chief town of Dumbarton co., is situated mainly on the left bank of the Leven, near its junction with the Clyde, and 13 m. w.n.w. of Glasgow. It is rather closely built, and chiefly consists of a long semicircular street, parallel to the river. The chief branches of industry carried on in the town of D. are ship-building, marine-engine and machine making, iron-forging, iron and brass founding, and rope-making. It has regular steam-communication with Glasgow, Greenock, and other Clyde ports. Pop. '91, 14,172. It unites with Kilmarnock, Renfrew, Rutherglen, and Port Glasgow in sending one member to parliament. D. is supposed to have been the Roman station Theodosia, and the capital of the kingdom of the Britons, on the vale of the Clyde. Alexander II., in 1222, made it a royal burgh. To the e. of the alluvial plain, at the mouth of the Leven, stands the famous and picturesque castle of Dumbarton, on a steep, rugged, basaltic rock, rising

to the height of 560 ft., a mile in circuit at the base, and forming nearly an island at high water. The rock almost hides the town of D. from the Clyde.

DUMBARTONSHIRE (anciently, Lennox, Levenax, or Leven's field), a sickle-shaped co. in the w. of Scotland, bounded e. by loch Lomond, Stirling, and Lanark; s. by Renfrew and the Clyde estuary; w., by loch Long and Argyle; and n., by Perth. It is 35 m. long, and 15 (average $7\frac{1}{2}$) broad, with 35 m. of coast; area, 297 sq. miles. On the e., it has a detached part of 12 sq.m., inclosed by Stirling and Lanark. The s. coast on the Clyde is mostly low and sandy. Loch Long forms 20 m. of the w. border. The Gare loch, one mile broad and 6 long, forms, with loch Long, the Roseneath peninsula in the s.w., studded with beautiful villas. Loch Lomond for 24 m. bounds the e. side of the co., the hills rising from a low, narrow, and wooded shore. Here is the romantic scenery of part of Rob Roy's country described by Scott. The n. of the co. is mountainous or hilly, rising in Ben Voirlich 3,300 ft. The scenery of D. is very romantic, and the co. forms the route to the w. highlands of Argyle and Perth. The ancient ferry from the lowlands to the highlands was between Port Glasgow and Cardross. There are many streams, and 9 fresh water lakes, the largest being loch Lomond. The chief rivers are the Clyde, along the s. border; and the Leven, the outlet of loch Lomond, and running 6 m. into the Clyde, at the foot of Dumbarton rock. The rocks are mica-slate, talc-slate, clay-slate, trap, coal-measures, and carboniferous limestone. The mineral products are coal, freestone, limestone, ironstone, and slates. The climate is mild and humid. The arable lands lie chiefly s. of loch Lomond, and along the Clyde e. and w. of Dumbarton Castle. Pop. '91, 94,511.

DUMB-BELL, is a name given to a weight used in calisthenic exercises. It consists of two balls of iron connected by a short iron bar for a handle. The present form of dumb-bell was in use in England as early as the reign of Queen Elizabeth; and weights called *halteres* that were similar to our dumb-bells were used by the quoit-players in the early Grecian games.

DUMB CANE, *Dieffenbachia seguina*, formerly called *arum sequinum* and *caladium sequinum*, a plant of the natural order *araceæ*, remarkably differing from the plants of that order generally in its almost arborescent character, but agreeing with them in its acidity, which is in none of them more highly developed. It has a cylindrical stem, with ringed scars and oblongo-ovate leaves. It is a native of the West Indies, and has received its English name from the property which it has of producing dumbness when chewed, its acrid poisonous juice causing an immediate swelling of the tongue, accompanied with excruciating pain. The juice is, however, sometimes used to effect the granulation of sugar. A decoction of the stem is used as a bath and fomentation in dropsy, and the root-stock is used in obstinate constipation.

DUMBNESS. See DEAF AND DUMB.

DUMB-WAITER, a set of circular shelves, turning on a pivot, on which dishes and table necessities are placed and brought within reach by turning the waiter on its axis; also, a movable framework, balanced with weights, so as to be easily operated by means of cords and pulleys, and employed to convey articles from one story of a house to another.

DUMDUM, the name of a t. and of a valley in India.—1. The town is well known in the military history of the country, standing in lat. $22^{\circ} 38'$ n., and long. $88^{\circ} 30'$ east. It is 10 m. to the s.e. of Barrackpore, and 8 to the n.e. of Calcutta, having extensive accommodations for troops, and a cannon-foundry. The place is famous in connection with the mutiny of 1857, as the scene of the first open manifestation on the part of the Sepoys against the greased cartridges.—2. The valley leads into Cashmere from the s. over what is called the Pir Panjal pass, whose crest is 11,800 ft. above the level of the sea. It is about lat. $33^{\circ} 45'$ n., and long. 75° east.

DUMFRIES, a royal, parliamentary, and municipal burgh, river-port, and county-town of Dumfriesshire, on the left bank of the Nith, 9 m. from its mouth in the Solway firth, 73 m. s. by w. of Edinburgh, and 33 w.n.w. of Carlisle. It stands on a rising ground, surrounded, except towards the sea, by fine, undulating hills, many of which are green to the top. It is an irregularly built town of red freestone, and is reckoned the capital of the s. of Scotland. Two bridges cross the Nith to Maxwelltown, a suburb in Kirkcudbright. One of the bridges is believed to have been built about 1280, by Devorgilla, the mother of John Baliol, and to have had 9 arches, although some antiquaries claim 13, with a central gate. It is largely, however, a structure of the 17th c.; only six of its arches now remain; and it is limited to foot-passengers. The most noticeable building in D. is the mid-steeple, in the center of the High street, which was at one time believed to have been erected by Inigo Jones; the architect is now, however, ascertained to have been Tobias Bachup, of Alloa. The very high tides of the Solway firth bring vessels of 40 tons up to the town, and larger ones to the river quays below the town. In 1875, 496 vessels of 25,675 tons entered, and 306 of 19,106 cleared the port. D. has three large and two small manufactories of woollen cloths (Tweeds); it manufactures hosiery, leather, baskets, and wooden shoes; and it has a considerable reputation for its dye-works, and the nurseries in its vicinity. The chief exports are woollen cloths, wool, hosiery, shoes, sheep, grain, wood, and bark. D. is noted for its markets, live-stock being here transferred from Scotch to English dealers. Pop. '91,

17,800. It unites with Annan, Sanquhar, Lochmaben, Kirkcudbright, and its suburb, Maxwelltown, in sending one member to parliament. D. arose, it is believed, in a castle, of which nothing now remains. The early Scotch and English kings had frequent contests for its possession. About 1200, a monastery was founded here, in the chapel of which Comyn was stabbed by Robert Bruce in 1305. The Highlanders, under Prince Charles, in 1745, fined D. £4,000, and plundered and burned it. Burns spent the last years of his life here as an exciseman, and the house he resided in, and the mausoleum erected to his memory, are among the most notable objects of the place.

DUMFRIESSHIRE, a border co. of Scotland, on the Solway firth, having Kirkcudbright on the west. It forms an irregular ellipse, 55 m. by 32, with 22 m. of coastline on the Solway firth, to which its surface slopes; area, 1063 sq. m. The n. half is mountainous, rising, in Hartfell, 2,650 ft.; Lowther Hills, 2,377; Black Lark, 2,231; Ettrick Pen, 2,258; and Queensberry, 2,285. The s. part is undulating. The country on the Solway firth (q. v.) for 10 m. inland is flat, sandy, and gravelly, with tracts of "cobbles," or large stones. D. is drained principally by three rivers—the Nith, 45 m. long; the Annan, 40; and the Esk, 40; which run s.e. and s. into the Solway firth from the n. border of the co., and divide it into three districts or dales, called after the rivers. There are many small lochs, three of them near Lochmaben, containing vendace. D. consists of Silurian, permian, and carboniferous strata, with eruptions of trap. Tor-toise footprints have been found in the new red sandstone of Annandale, at Corncockle. The mineral products are coal, limestone, ironstone, lead, and silver. There are extensive lead-mines at Wanlockhead, 2 m. from Leadhills, in Lanarkshire. Gold has been obtained in quartz veins in the hills near Wanlockhead; a mass of 5 ozs. found there is now in the British museum. Limestone is quarried in the parishes of Keir and Carmertrees; zinc ore is mined at Abington, and coal at Sanquhar and Canonbie. There are noted sulphureous springs at Moffat, and chalybeate ones at Hartfell. The climate is moist and mild, and most of the land has a southern exposure. There are rich alluvial tracts along the rivers and on the Solway firth. The Lochar Moss, a peat tract on the Solway firth, is 13 by 2 to 3 m., and contains shells, trees, and fragments of ships. The chief occupations are agriculture, and the rearing of cattle, sheep, and pigs. Sheep-farms occupy the hills. The chief exports are cattle, sheep, grain, wool, hams, and bacon. There are fisheries of salmon in the rivers. In 1881, D. had 76,140 inhabitants; 12,672 children between 5 and 13 years of age receiving education; pop. '91, 74,245. D. sends one member to parliament. The co. abounds in antiquities. D. formed part of Valentia in Roman times, and subsequently of the kingdom of Strathclyde.

DÜMICHEN, JOHANNES, born Silesia, 1833; studied at Berlin, and turned his attention to Egyptian archæology. He made several trips to that country, and made some remarkable discoveries concerning the temple of Denderah. He has written nearly a dozen works on Egyptian and other archæology. He d. in 1894.

DUMMER, JEREMIAH, 1680–1739; born Boston; graduated at Harvard; studied theology and spent some years in the university of Utrecht. He was in England as one of the agents of Massachusetts, and became familiar with Bolingbroke, some of whose views, it is thought, he adopted. He published a *Defence of the New England Charters*, and some less important works. His brother, WILLIAM, 1677–1761, lieutenant-governor, founded the Dummer academy at Newbury, Mass.

DUMMOW, a t. of India, in the division of Jubbulpore, Central Provinces, stands in lat. 23° 50' n., and long. 79° 30' e., being 775 m. to the westward of Calcutta. It has a large bazaar, and is abundantly provided with wells. The district in which it stands had a pop. '91, of 326,000. Pop. of town, '91, 11,800. D. is also spelt *Damoh*.

DUMONT, PIERRE ETIENNE LOUIS, an able propagator of the Benthamite philosophy, was b. at Geneva, 18th July, 1759, studied theology, and after officiating as a minister for a short time in his native town, proceeded to St. Petersburg in 1783, where he accepted the charge of the French Protestant church. In 1785, he left Russia, went to England, and became tutor to the sons of lord Shelburne, afterwards marquis of Lansdowne. His superior talents, liberal sentiments, and fine character, soon recommended him to the illustrious whigs of that period; with sir Samuel Romilly, in particular, he formed a close friendship. During the early years of the French revolution, D. was at Paris, where he became greatly attached to Mirabeau, regarding whom he has given the world much important information in his *Souvenirs sur Mirabeau et sur les deux Premières Assemblées Législatives* (which were not published till 1832, three years after the author's death). From this work, it appears that D. wrote many of the best articles and speeches attributed to Mirabeau. In 1791, D. returned to England, and formed an intimacy with Bentham. This was certainly the most important event in his life. Deeply convinced of the value of that philosopher's views of legislation, he requested his friend to allow him to arrange and edit his unpublished writings on this subject. Bentham gave him his manuscripts. D. labored earnestly to abridge, elucidate, correct, and simplify what he had received. The results appeared in his *Traité*

de *Législation Civile et Penale* (Geneva, 1802); *Théorie des Peines et des Récompenses* (Geneva, 1810); *Tactique des Assemblées Législatives* (Geneva, 1815); *Preuves Judiciaires* (Geneva, 1823); and the *Organization Judiciaire et Codification* (1828, a posthumous work). D. returned to Geneva in 1814, and became a member of the representative council. In this office he found many opportunities of putting the principles of Bentham into practice, and thus greatly benefited his native city. He died in 1829, at Milan.

DUMONT D'URVILLE, JULES SÉBASTIEN CÉSAR, 1790-1842; native of Normandy; a French navigator. He was self-taught, mastering botany, entomology, and a number of modern and ancient languages. In 1820, while on a surveying trip in the Mediterranean, he was so fortunate as to recognize in a Grecian statue just unearthed the Venus of Milo, and to secure its preservation. In later years, he was concerned in explorations around the Australian continent, New Zealand, Van Dieman's Land, and other Pacific and Indian islands. In 1830, he transported the exiled Charles X. to England. His next and most important venture was in antarctic exploration. He sailed in Sept., 1837, with two vessels. In Jan., 1838, they reached the antarctic ice, along which they coasted to the e. for 300 miles. Turning w., they visited the South Orkneys, the New Shetlands, and discovered Joinville land and Louis Philippe's land; but sickness compelled them to run to Chili. Thence they crossed the Pacific, visiting the Fiji and Pelew islands, New Guinea, and Borneo. In 1840, they returned to the antarctic region, and discovered Adélie land. In Nov., he arrived at Toulon. D'Urville was at once appointed rear-admiral. In 1842, he was killed, with his wife and son, in a railway accident. His works on natural history, and especially his collections, are valuable.

DUMOURIEZ, CHARLES FRANÇOIS, a French gen., was b. at Cambrai, 25th Jan., 1739, entered the army in 1757, and served in Germany during the seven years' war. On the conclusion of hostilities in 1763, D., who possessed a restless, adventurous genius, went from one country to another, seeking active employment. Under Louis XVI., he held the office of commandant of Cherbourg, where he commenced the formation of a great naval establishment. As the revolution drew on, D. began to attach himself more closely to the popular party. In 1790, he became connected with the Jacobin club, and during the same year was appointed military commandant of lower Normandy. After holding for a short time the office of minister of foreign affairs, he became lieut. gen. in the army of the north, commanded by Maréchal Luckner. The allies were advancing in great force. By a series of bold and rapid maneuvers, D. prevented his enemies from sweeping over the plains of Champagne, and finally took up his position at Grand-Pré. Succors quickly arrived, and the victory of Kellermann at Valmy compelled the invaders to retreat. It is generally admitted that by his admirable strategic movements at this critical period D. saved France. A winter campaign in Belgium followed, and on the 5th and 6th Nov., 1792, D. overthrew the Austrians under the duke of Sachsen-Teschen and Clairfait at Jemappes. The campaign of 1793, which aimed at the complete conquest of the Netherlands, was opened with the siege of Maestricht; Breda and other places were taken by the French; but at Neerwinde, D. sustained a severe defeat from the Austrians under Coburg. D.'s Jacobinism had been cooling for some time, on account of the anarchy prevailing at Paris, and when commissioners were sent to remonstrate with him on account of his monarchical leanings, he told them nothing could save France from the horrors of anarchy but a constitutional monarchy; D. then entered into secret negotiations with Coburg, evacuated Belgium, and promised to exert himself on behalf of the Bourbon family. He was now accused of being a traitor, by the authorities of Paris; but when requested by the commissioners to proceed to the capital, and stand his trial, he answered by handing over the representatives of the people to the Austrians. He next endeavored, but in vain, to win the army over to his plan of marching upon Paris, and re-establishing the royal authority, and D. had to take refuge, accompanied by the duc de Chartres, in the ranks of the enemies of France. The convention set a price of 300,000 francs upon his head. After wandering through many countries of Europe, he finally settled in England, where he died an exile at Turville Park, near Henley-upon-Thames, 14th Mar., 1823. Besides a multitude of pamphlets, D. wrote *Mémoires du Général Dumouriez* (Hamburg, 1796), and *La Vie et les Mémoires du Général Dumouriez* (3d edit., Paris, 1822-24).

DUMPY LEVEL, a leveling instrument for short distances. It has a short telescope with large field, and the compass is fixed underneath.

DUN, a root common to the Celtic and Gothic languages, signifying a hill or height. Besides giving rise to the Fr. *dunes*, Ger. *dünen*, Eng. *downs* (q.v.), it enters extensively into the names of places (becoming often *dum*, *don*), as *Dunkirk*, *Dumbarton*, *Donegal*. It is allied to the Ang.-Sax. *tun*, *ton*, whence *town* (q.v.).

DŮNA, DWI'NA, or DVÍ'NA, the name of a river of Russia, which rises in the government of Tver, in the neighborhood of the source of the Volga, and flows w.s.w. in a course almost parallel to that of the Dnieper. At Vitebsk, the D. turns to the w., then to the n.w., and advances in that direction toward its debouchure in the gulf of Riga,

passing the towns of Disna, Drissa, Dünaburg, Jacobstadt, and Riga. The entire length of the D. is about 650 miles. It is navigable from Dünamünde, at its mouth, to Veli, on the border of the government of Smolensk—a distance of 400 m.; but the navigation, owing to its shallows, its rock obstructions, and sand-banks, is extremely difficult and dangerous, except during the spring and autumn floods. The basin of the D. is estimated at 28,350 sq. m.; at Riga, its breadth is 2,400 feet. In the spring, the surface of the D. is covered with rafts and planks, which are floated down from the forests of the provinces through which it flows. Its waters, which abound in fish, are connected with those of the Dnieper by means of the Beresina canal, which thus connects the Black sea and the Baltic. See also DWINA, NORTHERN.

DÜNABURG, or DINABURG (official name DVINSK), a strongly fortified t. of western Russia, is situated on the Düna, in the government of Witebsk. It is of great military importance, owing to the strength of its fortifications. It has considerable trade. D. was formerly the capital of Polish Livonia. Pop. est. '93, 73,030.

DUNBAR, a royal, parliamentary, and municipal burgh, and very ancient seaport and t. in the n.e. of Haddingtonshire, on an eminence at the mouth of the firth of Forth, 29 m. e.n.e. of Edinburgh. The coast near D. consists of basaltic rocks and islets, and gives fine views of the Bass Rock, the isle of May, and Fifeshire. D. is a fine old town. It has a sailcloth and cordage manufactory, a paper mill, and extensive tile-works, breweries, etc., but the chief industry is the fisheries, in connection with which there are large curing establishments. The old harbor is impeded at the entrance by craggy islets and sunken rocks, but is accessible to vessels of 300 tons. About the year 1840, an additional harbor, called the Victoria harbor, was erected at D., at the expense of the fishery board and town; with recent important repairs and improvements, it has cost altogether upwards of £50,000. It has 4 ft. at low water, and is considered one of the best suited for fishery purposes in the country. Large quantities of herrings are annually exported from D., besides what are used for local consumption. The other exports are chiefly corn and potatoes. Pop. '91, 3,545. D. unites with North Berwick, Jedburgh, Haddington, and Lauder in sending a member to parliament. On the high rocks at the entrance to the new harbor are a few fragments of the ruins of a castle, which, from the end of the 11th c., was the chief seat of the ancient earls of March. It was once very strong, and an important security against English invasions: Edward I. took it, and Edward II. fled thither after the battle of Bannockburn; it was demolished in 1333, and rebuilt in 1336; it was successfully defended in a siege of six weeks against the earl of Salisbury by Black Agnes, countess of Dunbar, in 1338; it sheltered queen Mary and Bothwell in 1567; and in the same year it was destroyed by the regent Murray. In 1650, Cromwell, at the "Race of Dunbar," defeated the Scottish army under Leslie.

DUNBAR, WILLIAM, the greatest of the old Scottish poets, is supposed to have been born about 1460. In 1475, he went to St. Andrews, where, in 1477, he took the degree of B.A., and in 1479, that of M.A. Considerable obscurity rests upon his career for about twenty years after he left the university. From his own writings, we learn that he entered the order of St. Francis, and was employed for some time as an itinerant or preaching friar. In that capacity, he "ascended the pulpit at Dernton and Canterbury, and crossed the sea at Dover, and instructed the inhabitants of Picardy." He appears to have entered the king's service, and to have been retained as "clerk" or secretary to some of James's numerous embassies to foreign courts. In 1500, he obtained from the king a yearly pension of £10. In 1501, he visited England, in the train, as his biographers suppose, of the ambassadors sent thither to conclude the negotiations for the king's marriage. On the 9th May, 1503, three months before the queen's arrival, he composed in honor of the event his most famous poem, the *Thrissil and the Rois*. He seems now to have lived chiefly about court, writing poems, and sustaining himself with hope of preferment in the church. On the 17th Mar. 1504, he received a gift for saying mass for the first time in the royal presence. At Martinmas, 1507, his pension was doubled, and three years afterwards, it again received augmentation. He is supposed to have visited the northern parts of Scotland in May, 1511, in the train of queen Margaret. After the ruinous defeat at Flodden, and the confusion consequent on the king's death and a prolonged regency, D.'s name disappears altogether. He is supposed to have died about 1520.

As a poet, he possessed a wonderful variety of gifts; his genius comprised the excellences of many masters. He is at times as rich in fancy and color as Spenser in the *Faery Queen*; as homely, and shrewd, and coarse as Chaucer in the *Miller's Tale*; as pious and devotional as Cowper in his *Hymns*; and as wildly grotesque in satire as Burns in his *Death and Doctor Hornbook*. When Scott read portions of his works to Crabbe, in Edinburgh, the latter remarked that, "before the Ayrshire plowman, Scotland possessed at least one great poet." A complete and carefully elaborated edition of D.'s works, by Dr. David Laing, was published at Edinburgh in 1834.

DUNBLANE, a city and burgh of barony in the s. of Perthshire, picturesquely situated on the left bank of the Allan, on the Scottish Central railway, 28 m. s.w. of Perth, and 5 n. of Stirling. It takes its name from St. Blane, a bishop of the 7th or 8th c., said to have been born in Bute. It mainly consists of one street of old-fashioned

houses. Pop. '91, about 2500. The cathedral of D., chiefly in the first-pointed or early English style, about the year 1240, is now in ruins, except the choir, used as the parish church, 80 by 30 ft., with a tower 128 ft. high, the first four stages of which are Romanesque work of about the year 1140. The prebendary stalls of richly carved oak still remain. Of the bishops of D., by far the most celebrated was Robert Leighton, who held the see from 1661 till 1672, when he was translated to Glasgow. A path near the river, which he is said to have frequented, still bears the name of "The Bishop's Walk;" and the library which he bequeathed to his diocese, is still kept in the town. Two m. from D. was fought, in 1715, the indecisive battle of Sheriffmuir, between the royal forces, under the duke of Argyre, and the troops of the pretender, under the earl of Mar. D. once had an ancient Culdee monastery.

DUNCAN, ADAM, Viscount, a celebrated British admiral, was b. in 1731 at Dundee, entered the navy as midshipman in 1746, became lieut. in 1755, and in 1761, commander of the *Valiant*, of 74 guns, which took part in the expedition to Havana under admiral Keppel. In 1789, he was appointed rear-admiral of the blue, and in 1793, vice-admiral of the blue, but had little opportunity of distinguishing himself, and was even meditating, it is said, retiring altogether from the service, when he was appointed to the command of the united English and Russian squadron in the North sea, with the special design of watching the movements of the Dutch fleet—Holland and France being then both at war with England. D.'s blockade of the Texel was one of the most effective ever made, and the Dutch trade was almost ruined. During the blockade, a mutiny took place among the seamen, and D.'s position was for some time very critical, but the insubordination was ultimately quelled. Although weakened by the recall of the Russians, he gained a brilliant victory over the Dutch near Camperdown, 11th Oct., 1797, where he took the Dutch admiral, De Winter, prisoner. D. was rewarded with a pension of £2,000, and raised to the peerage, with the title of viscount. In 1799, he was promoted to the rank of Admiral of the White, and died 4th Aug., 1804, after having inherited the family estates in Perthshire, on the death of his brother.

DUNCAN, SARA JEANETTE, an American author, was born in Brantford, Ontario, Canada, in 1863, where she received her education. Her first literary work was contributions to Canadian periodicals. She made a tour of the world as newspaper correspondent. She was married in 1890 to Mr. Everard Cotes of Calcutta, India. She has published *A Social Departure* (1890), *An American Girl in London* (1891), *The Simple Adventures of a Memsahib* (1893).

DUNCAN, THOMAS, R.S.A., and A.R.A., was b. at Kinclaven, Perthshire, May 24, 1807; and died at Edinburgh, 25th May, 1845. He studied in the Trustees' academy, under sir William Allan; was his successor as head-master of that school, and one of the most distinguished members of the royal Scottish academy. His portraits, and historical and fancy subjects, evince delicate feeling for female beauty, and keen appreciation of the humorous in Scottish character. The drawing is always careful and correct, and the coloring remarkable for clearness and delicacy. Though he exhibited but few pictures in the royal academy of London, they at once attracted marked attention, and he was elected an associate of that body in 1843. The principal works he exhibited there were: "Anne Page and Slender," an illustration from the ballad of *Auld Robin Gray*, now in the Sheepshanks gallery, South Kensington; "Prince Charles's Entry into Edinburgh after the Battle of Prestonpans"—and the same prince, when a fugitive, concealed in a cave. He had now entered on a most successful career, and was engaged on the studies for two important works: "Wishart Dispensing the Sacrament on the Day of his Martyrdom;" and a large picture for the marquis of Breadalbane, "Queen Victoria at Taymouth," when he was seized with an illness which terminated fatally. One of his latest works was a portrait of himself; it is now in the national gallery of Scotland, and is an excellent specimen of careful drawing, united to great power of color and effect. That D. was remarkable for energy and industry, is proved by the number and high quality of the works he executed, though he died at the early age of thirty-eight. His portraits, especially those of ladies and children, will always hold a high place. Though constantly engaged on fancy subjects, he every year exhibited a very considerable number of portraits. In addition to the works above referred to, the following is a list of the principal historical and fancy subjects exhibited by him in the royal Scottish academy—1829: "The Death of Old Mortality," and "A Milk-girl," 1830: "The Braw Wooer," and "Children and Rabbit." 1831: "Lucy Ashton," and finished sketch of "Jeanie Deans and the Robbers." 1832: "Girl with Flowers." 1834: "Cuddie Headrig Visiting Jenny Dennison." 1835: "Mary Queen of Scots compelled to Sign her Abdication." 1836: "A Covenanter," and "Old Mortality Renewing the Inscription on a Tombstone."

DUNCANSBY HEAD (the *Berberium* of Ptolemy), a promontory forming the n.e. extremity of Caithness, in lat. 58° 39' n., and long. 3° 1' w., and one mile and a half e. of John o' Groat's house. In the vicinity are deep long chasms or *ghoos*, in the Devonian strata, and curious detached sandstone columns in the sea called *stacks*. One of the chasms is 300 yards long, 12 to 15 wide, and 100 ft. deep, and communicates with the sea by three openings, one of which is arched. The horizontal beds of the sides of the perpendicular gullies look like ruined walls.

DUNCE. See **DUNS SCOTAS.**

DUNCIAD, *THE*, by Alexander Pope, was published in 1728, in three books; and to these, in 1742, a fourth book was added. Pope had been, during the greater part of his career, afflicted by a host of critics and detractors. His own genius had not been spared; the worst motives, personal and literary, had been imputed to him; and he resolved to mete unto his enemies the measure which had been meted unto himself. Hence the origin of *The Dunciad*. Never was chastisement more complete. On its publication, a universal howl of rage and pain arose. The satire conferred immortality on his opponents. Pope was a good hater, and his hatred and contempt defy the tooth of time more completely than all the balsams of the Pharaohs.

DUNCKER, MAXIMILIAN WOLFGANG, b. Berlin, 1811; graduate and professor at Halle. He was a member of the Frankfort parliament, and of the Prussian diet. In 1861, he was counselor to the crown prince, and in 1867, director of the Prussian archives. His chief work is a *History of Antiquity*. He d. 1886.

DUNCOMBE, THOMAS SLINGSBY, an English politician, nephew of first lord Feverham, was b. 1796. He was elected M.P. for Hertford in 1824, assisted in carrying the reform bill, and became a prominent member of the extreme liberal party. In 1832, he was rejected at Hertford; but in 1834 he was returned for Finsbury, which seat he retained in the parliament which assembled in 1859. In 1842, he presented the Chartist petition, signed by 3,000,000 of the lower classes in favor of universal suffrage, vote by ballot, short parliaments, etc. In 1843, the then home secretary, sir James Graham, having sanctioned the opening of the letters of Mazzini, D. stood up in the house of commons and denounced, with bitter and scathing invective, the adoption of the post-office spy-system on English soil. He was an earnest advocate of Jewish emancipation; and his motion in 1858 for placing baron Lionel Rothschild on a committee of the house of commons, was soon followed by the concession, by the latter chamber, of the right of Jewish members to sit in the house of commons. He died Nov. 13, 1861.

DUNDALK, a parliamentary and municipal borough and seaport, the capital of the county of Louth, Ireland, is beautifully situated at the mouth of the Castleton river, 50 m. n. of Dublin. It is overlooked on the n.e. by the Carlingford mountains. Vessels drawing 16 ft. can enter the harbor. D. has manufactures of tobacco, soap, leather, starch, and salt; steam flour-mills; considerable fisheries; a distillery, brewery, and a flax-spinning mill. The chief imports, especially from Liverpool, are groceries, timber, coal, iron, slates; and the exports, flax, linen, and all sorts of agricultural and dairy products and live-stock. D. is the chief outlet for the produce of the counties of Louth, Monaghan, and Cavan. Pop. '81, 11,974, of whom 8969 were Roman Catholics, and 1803 Episcopalians. Pop. '91, 12,449. It has no parliamentary representation. It has the remains of a Franciscan friary and a Druids' circle. The last king of all Ireland was crowned here. Edward Bruce took D. in 1315, and held his court here till killed in battle at Faughart, in the vicinity, in 1318. D. was captured by the Irish in 1641, by Cromwell in 1649, and by Schomberg in 1689. **DUNDALK BAY** is 8 m. long by 7 broad, and with 4 to 6 fathoms of water in the middle. It receives the Fane, Dee, and Castleton rivers.

DUNDAS. 1. A castle and manor on the s. bank of the firth of Forth, near South Queensferry; the castle is a square tower of the 15th c., with modern additions; the manor was the original seat of the distinguished family of D., to whose progenitor it was granted by the earl of March about the year 1150.—2. A town in the province of Ontario, Dominion of Canada, at the head of Burlington bay, at the w. of lake Ontario. Pop. '91, 3546. It is a station on the Great Western railway, and has a number of mills and manufactories.—3. An island, belonging to Great Britain, situated on the n.w. coast of America, 40 m. n.e. of Queen Charlotte island. It has Dixon's Entrance (q.v.) on the w., and is separated by Chatham sound from the most southerly of the Alaskan islands.—4. A group of nearly 500 islets, all of coralline formation, lying off the e. coast of Africa, being about lat. 1° south. There is only one secure harbor.—5. A river flowing into Delagoa bay (q.v.).—6. A strait in North Australia, separating Melville island from Coburg peninsula, being 18 m. in breadth.

DUNDAS, a co. in Ontario, Canada, on the St. Lawrence, intersected by the Grand Trunk railroad; pop. '81, 20,598; '91, 20,132. Chief town, Cornwall.

DUNDAS (of Arniston), the name of a Scottish family singularly distinguished for legal and political talent. Sir James D., the first of Arniston, received the honor of knighthood from James VI., and was governor of Berwick. His son, sir James D., was appointed a judge of the court of session in 1662, and took his seat on the bench under the title of lord Arniston, but was soon after deprived of his office for refusing to abjure the "National and Solemn League and Covenant." He died in 1679. His eldest son, sir Robert D., who also rose to the bench, died in 1727. **DUNDAS, ROBERT**, the son of the preceding, was born 9th Dec., 1685; became a member of the faculty of advocates in 1709; and in 1717 was appointed solicitor-general for Scotland, an office which he filled with great ability in a period of much political confusion. In 1720 he was made lord advocate; and in 1722 was chosen to represent the county of Edinburgh in the British parliament, where he honorably distinguished himself by his attention to

Scottish affairs. When sir Robert Walpole came into power in 1725, D. resigned his office, when he was elected dean of the faculty of advocates. In 1737, he was raised to the bench, when, like his father and grandfather, he took the title of lord Arniston. On the death of lord president Forbes of Culloden, in 1748, he was appointed his successor. He died in 1753. As an advocate, D. was a powerful and ingenious reasoner, and though somewhat disliked on the bench, his ability was universally admitted.—DUNDAS, ROBERT, the eldest son of the preceding, was born 18th July, 1713, studied at Edinburgh and Utrecht, was admitted to the Scottish bar in 1738, and rose to be lord advocate (1754), and president of the court of session (1760). D. died at Edinburgh, 13th Dec., 1787.

DUNDAS, the Right Honorable HENRY, Viscount MELVILLE, and Baron DUNIRA, brother of the preceding, was b. in 1742, and educated at the university of Edinburgh. He was admitted a member of the Scottish bar in 1763. As a younger son of a pretty numerous family, his circumstances were rather straightened; but his assiduity, his large share of the family talent, and no doubt of the family influence, soon procured him advancement in his profession. He was successively appointed deputy-advocate and solicitor-general. In 1774, he was returned to parliament for the county of Edinburgh, and in the following year was appointed lord-advocate for Scotland. Two years after, he was made keeper of the king's signet for Scotland. D.'s career in parliament was highly successful, though not very creditable to his political consistency. Elected in opposition to ministerial influence, he soon allied himself with the party in power, and became a strenuous supporter of lord North's administration, being one of the most obstinate defenders of the war with the American colonists. When lord North resigned in 1781, D. continued to hold the office of lord advocate under the Rockingham ministry. On the question of the war with America, D. had been opposed to Pitt; but when the coalition ministry was formed by Fox and lord North, he passed over to the side of his old opponent, and became Pitt's ablest coadjutor. When Pitt returned to the helm of the state in 1784, D. was appointed president of the board of control. In 1784 he introduced a bill for restoring the estates in Scotland forfeited on account of the rebellion of 1745. In 1791, he was appointed principal secretary of state for the home department. He also held a great number of other offices, one of which, the treasurership of the navy, involved him some years after in much trouble. D.'s aptitude for business was undeniable. Many of the most important public measures originated with, or were directly promoted by him. Among such were the formation of the fencible regiments, the supplementary militia, the volunteer corps, and the provisional cavalry; in short, the whole of that domestic military force raised during the war consequent on the French revolution. When Pitt resigned in 1801, D. did the same. In 1802, under the administration of Mr. Addington, he was elevated to the peerage by the titles of viscount Melville and baron Dunira. In 1805, his lordship was accused of "gross malversation and breach of duty," while acting as treasurer of the navy. The trial commenced 29th April, 1806; but in spite of the splendid array of whig talent against him, D. was acquitted on all the charges. After this, however, he took little part in public affairs, spending the most of his time in retirement in Scotland. He died at Edinburgh, 28th May, 1811.

DUNDEE (Lat. *Taodunum*, the "hill or fort on the Tay") a royal parliamentary and municipal burgh and seaport, in the s. of Forfarshire, on the left bank of the estuary of the Tay, here two m. broad, 10 m. from the entrance of that river into the sea, 50 m. n.e. of Edinburgh, 20 e.n.e. of Perth, and 14 s.e. of Forfar. In population, it is the third town in Scotland. It stands mostly on the slope between Dundee law (525 ft. high, composed of trap, and with traces of ancient vitrification) and Balgay hill and the Tay. The new streets are wide and well laid out. The most striking architectural features of the town are—the town hall, in the Roman Ionic style, with a spire 140 ft. high, erected by the "elder Adams," in 1734; the Albert institute including a free library, picture galleries, museum, etc., in 15th c. Gothic, from designs by sir Gilbert Scott; the royal exchange, built in the Flemish pointed style of the 15th c., and opened in 1856; the eastern club house; the corn exchange; the infirmary; the judiciary and sheriff-court buildings; the post-office; the high school; the town's churches, with the old tower, 156 ft. high, restored in 1873, under the charge of sir Gilbert Scott, at a cost of £7,000; St. Paul's Episcopal church, with a tower and spire 217 ft. high; St. Paul's free church, with a tower and spire 167 ft. high; and St. Enoch's free church, with two handsome towers; the Morgan hospital (opened 1868), erected and endowed, under the will of John Morgan, a native of Dundee, for the maintenance and education of 100 boys; a new orphan asylum, University College founded in 1882 and affiliated with St. Andrews University, Kinnaird Hall and a technical institute. D. has several public parks, one of which, the Baxter park, on a beautiful slope to the eastward of the town, is 37 acres in extent, and was presented by sir David Baxter; another, to the westward of the town occupies the hill of Balgay, and is finely wooded and beautifully laid out, its extent being about 36 acres. Besides these are Lochee Park, acquired in 1891 and having 25 acres; Dudhope Park (1893), with 24 acres; The Law, and the old common called the Magdalen Green. D. is the chief seat in Great Britain of the manufacture of coarse linen fabrics (osnaburgs, sheetings, ducks, dowlas, drills, canvas, and cordage). Manufactures of jute are very extensively carried on here. Till 1830 the material of its

manufactures was flax imported from Russia, but jute was at that time introduced and now constitutes the raw material of the chief manufacturing industry in D. Of jute many varieties of fabric are made, from the coarsest nail-bagging to carpets of great beauty. This range includes packages for every species of merchandise, sacks for wool, coffee, guano, etc. Between 1870 and 1890 the imports of jute from D. increased from 81,740 to 226,111 tons. D. is also famous for its manufacture of confectionery and marmalade. D. is the center of the whale and seal fishing trade of Great Britain. Shipbuilding (both wood and iron) and machine-making are carried on to some extent. D. has magnificent harbors in addition to the tide harbor, several large wet docks, two graving-docks and a jetty for vessels drawing more than 24 feet of water. At the n. end of the mid quay stands the royal arch in commemoration of her majesty's landing here in 1844. D. is well supplied with water. At the entrance of the firth one of the largest iron bridges ever constructed has been built across the Tay. It was opened in 1887, and is more than two miles long. Pop. '96, 161,620. D. sends two members to parliament. It was an important place in the 12th century. Edward I. was here in 1296 and 1303. Wallace is said to have taken the castle in 1297, and Bruce demolished it in 1313. The duke of Lancaster burned D. in 1385, and the marquis of Montrose pillaged it in 1645. The active part taken by its inhabitants in the Reformation won for the town the title of the "Scottish Geneva." Charles II. lived here, after his coronation at Scone, in 1650. On the refusal of D. to submit to Cromwell, gen. Monk, 1651, sacked and burned it, massacring 1000 citizens and soldiers, and filling 60 vessels with booty, which were totally wrecked on their voyage to England. D. was one of the first Scotch towns to adopt the Reformation. Wishart the martyr preached here during the plague of 1544.

DUNDEE, VISCOUNT. See GRAHAM, JOHN.

DUNDONALD, THOMAS COCHRANE, Earl of, son of the ninth earl of Dundonald, was b. Dec. 14, 1775. He, while still a boy, entered the 104th regiment. At the age of 17, he joined the *Hind* corvette, commanded by his uncle, capt. sir Alexander Cochrane. In 1800, he became master and commander of the *Speedy* sloop-of-war, of 14 guns and 54 men; and in 10 months he took 33 vessels, carrying together 128 guns and 533 men, besides assisting in the capture of many others. D. received his post-rank, 1801, for the capture, by boarding, of *El Gamo*, a Spanish frigate of 32 guns, off Barcelona. In 1803, he was appointed to the *Arab*, 22, and served at the blockade of Boulogne. In 1804, he removed to the *Pallas* frigate, 32, and was sent out to assist his uncle, then employed in the blockade of Ferrol. He made several valuable prizes while cruising off the Spanish coast, among others the *Fortuna*, with specie to the amount of £150,000, besides merchandise, but generously returned 10,000 crowns to the Spanish capt. and supercargo. In 1806, he cut out the *Tapaguese* corvette, which lay in the Gironde, under the protection of two heavy batteries. He destroyed the semaphores along the French coast, and carried by storm the battery at Pointe l'Equilon, which he blew up. Being now transferred to *L'Impérieuse*, he took and destroyed, in the month ending Jan. 7, 1807, 15 of the enemy's ships, chiefly laden with wine and provisions. He was next sent to co-operate with the patriots on the coast of Catalonia, and contributed to the surrender of the castle of Mongat. After harassing the French coast, and destroying the semaphores on the coast of Languedoc, he volunteered for the defense of fort Trinidad, at Rosas, on the coast of Catalonia. At the head of 80 of his own men, and the same number of Spaniards, he repelled 1000 of the enemy in an assault made by them upon the castle. He protracted the siege for 12 days, then blew up the magazine, and returned to his ship. In April, 1809, he was selected by the admiralty for the daring and hazardous service of burning the French fleet then lying at anchor, and blockaded by lord Gambier, in the Basque roads. At night he went on board one of the fireships, containing 1500 barrels of gunpowder, and performed the service intrusted to him with characteristic intrepidity. He was rewarded with the knighthood of the bath. He had been chosen M.P. for Westminster in 1807, and his charges of incompetency against lord Gambier led to a court-martial upon that nobleman. Lord Gambier, after a partial trial, was acquitted, and the professional prospects of his assailant were ruined. During the rest of the war, the country lost the incalculable benefit of his services at sea, the navy gaining, on the other hand, such small advantage as could in those days be derived from D.'s protest in parliament against naval abuses. Early in 1814, he was accused of complicity in fraudulent stock-jobbing transactions. A rumor of the downfall of Napoleon having caused a sudden rise in the funds, D. and his friends were charged with having fraudulently propagated the rumor, and with having "sold out" to a large amount. He was found guilty of fraud, and was sentenced to pay a fine of £1000, to suffer a year's imprisonment, and to stand in the pillory. The latter part of the punishment was remitted, but he was deprived of the Order of the Bath, of his rank in the navy, and expelled from the house of commons. A new writ was issued for Westminster; but his constituents immediately re-elected him, notwithstanding his expulsion from the house; and his daring was shown by his escape from prison, and his re-appearance in the house. He represented Westminster until 1818, when, panting for a more active and eventful career, he drew his sword in defense of the independence of the South American colonies of Spain. The command of the fleet of the republic of Chili

was offered to him, and the terror of his name materially contributed to the success of the national cause. Valdivia, the last stronghold of the Spaniards, was captured by him. Another daring exploit was the cutting out of a large 40-gun frigate from under the guns of the castle of Callao, 5th Nov., 1820. The emperor of Brazil, Dom Pedro, afterwards gave him the command of the Brazilian fleet, and created him a marquis. In 1827 and 1828, he assisted in the Greek war of independence. In 1830, the whig administration of earl Grey came into office, and, believing him to have been the victim of a cruel and unjust persecution, hastened to restore him to his naval rank. In 1831, he succeeded to the earldom. In 1847, queen Victoria conferred on him the grand cross of the bath. He was also appointed commander-in-chief on the North American and West India station. In 1851, he was vice-admiral of the white, and in 1854, rear-admiral of the United Kingdom, a distinction which he held until his death. On his retirement from active service, he devoted himself to scientific inventions. He made improvements in poop and signal lights, and especially turned his attention to naval projectiles. He declared himself to be in possession of a means of annihilating an enemy's fleet, and during the Russian war offered to destroy Sebastopol in a few hours with perfect security to the assailants. His plans were, however, rejected. When upwards of 80 years of age, he published his autobiography—the record of a career almost unequaled even by British seamen for desperate service and dauntless exploit. He died Oct. 31, 1860, and was interred in Westminster abbey. In his naval expeditions, it was his fate to be constantly opposed to forces greatly superior to his own in numbers and metal. His inventiveness and fertility of resource under such circumstances have perhaps never been equaled. His daring would have been, in a man of less genius, the height of rashness, yet the almost unvarying success of his maneuvers and exploits attests his forethought, and his happy adaptation of slender means to the achievement of great ends and noble enterprises. In person, he was tall and broad built; and a slight stoop, contracted by service in the small sloops and corvettes of his early days, scarcely impaired a height of stature that might be described as commanding. His features were Scottish in character, and strongly marked, bearing in deep lines the traces of struggle, sorrow, and the wear and tear of an unusually long, active, and eventful life.—In 1877, a petition was presented to the queen, asking compensation to D.'s heirs for his 18 years' loss of pay and allowances as a naval officer—a petition which was ultimately granted.

DUNDROM BAY, an inlet of the Irish sea, on the e. coast of Ireland, in the co. of Down, 5 m. to the s. of Downpatrick, is about 10 m. wide at its entrance, and forms a long curve into the shore, with a uniform breadth of about $2\frac{1}{2}$ miles.

DUNDY, a co. in Neb.; formed 1873; intersected by the Burlington Route railroad. Area, 912 sq. m. Pop. '90, 4012. Co. seat, Benkelman.

DUNE'DIN, the capital of the province of Otago, in New Zealand, is situated in lat. $45^{\circ} 50'$ s., long. $170^{\circ} 36'$ e., on the e. side of South island, towards its southern extremity. It is 200 m. by sea from Lyttleton, and 150 m. from Invercargill. It lies on the s. w. side of a bay. Entrance to the wharves is afforded to vessels drawing 19 feet of water by means of Victoria channel. Since its foundation by the New Zealand company, in 1848, the city has rapidly increased in importance; chiefly after the year 1861, when the discovery of extensive gold-fields in the neighborhood caused a sudden increase of population. For 3 years, the city, as well as the province, made great strides in wealth and prosperity; though subsequently the excessive increase of population was checked by a decrease in the yield of gold. The population of the city proper was in 1886, 24,243, a decrease of 38 since 1881; in 1896 the population was 22,815, with suburbs 47,280. D. is divided into four wards. It is as well laid out as the hilly nature of its site will allow, and is well paved and lighted. Encircling the city is a reserve called the Town Belt. There are many handsome buildings, including many churches. D. is the seat of an Anglican and a Roman Catholic bishop. Other public buildings are the post-office, hospital, government buildings, mechanics' institute, etc.; and the inhabitants of the city possess places of recreation in the Vauxhall gardens, botanical gardens, the grounds of the acclimatization society, and Jubilee Park, opened in 1887. It is the seat of the University of Otago and of a museum and art gallery. Steamers sail regularly between D. and Melbourne; and railways have been constructed both to the n. and s., already extending to Invercargill, 110 m. to the south-west. Several daily and weekly newspapers are published. The principal articles of export are grain, potatoes and wool—the last being by far the most important. The rapid extension of the wool traffic has been marvelous.

DUNES, from the same root as dun (q.v.), a hill, the name given to the sand-hills or mounds which stretch less or more along the sea-coast of the Netherlands and n. of France. These D. are a natural curiosity. "As if anxious to save the low countries from tidal inundation, nature has for centuries been energetically working to increase the magnitude of the mounds on the coast. At low-water, when the beach is exposed to the action of the winds from the German ocean, clouds of sand are raised into the air, and showered down upon the country for at least a mile inland; and this constantly going on, the result is, that along the whole line, from Haarlem to about Dunkirk or

Calais, the coast consists of sandy mounds of great breadth, partially covered with grass and heath, but unfit for pasturage or any other purpose, and these are the bulwarks which protect the coast. In some places, these D. look like a series of irregular hills; and when seen from the tops of the steeples, they are so huge as to shut out the view of the sea. The traveler, in visiting them from the fertile plains, all at once ascends into a region of desert barrenness. He walks on and on for miles in a wilderness such as might be expected to be seen in Africa, and at last emerges on the sea-shore, where the mode of creation of this singular kind of territory is at once conspicuous. Loose particles of sand are blown in his face; and as he descends to the shore, he sinks to the ankle in the drifted heaps. In some parts of these dreary solitudes, the sandy soil has been prevented from rising with the wind and injuring the fertile country, by being sown with the seeds of a kind of bent-grass, and in a few spots fir-trees have been successfully planted."—*Tour in Holland*, by W. Chambers. The English term *downs* (q. v.) has a similar meaning.

DUNFERMLINE, a royal burgh in Fife, of the western district of which it is the chief town. It is the seat of the sheriff courts of the district, which are held twice a week during the session. The town is situated on a long swelling ridge, 3 m. from the firth of Forth, and 16 m. w.n.w. from Edinburgh. It stands 300 ft. above the mean level of the firth, and from the s. has an imposing appearance. The date of its origin is not known, but it was a place of note before the end of the 11th century. Here, king Malcolm Canmore and his queen, St. Margaret, between the years 1070 and 1093, founded an abbey for Benedictines brought from Canterbury. In 1303-4, Edward I. of England wintered here, the buildings being then described as capable of accommodating three kings and their suites. In 1588, D. was created a royal burgh by James VI. David II., James I. of Scotland, and Charles I., were born here; and Malcolm Canmore, his queen Margaret, Edgar, Alexander I., David I., Malcolm the maiden, Alexander III., Robert Bruce, his queen Elizabeth, and nephew Randolph, Annabella, queen of Robert III., Robert, duke of Albany, governor of Scotland, were buried in the abbey and its precincts. The tomb of Robert the Bruce was discovered at the building of the new church, which was opened in 1821. The skeleton of the king was disinterred, and a cast was taken of the cranium. Some interesting fragments of the ancient regal and ecclesiastical magnificence of D. still remain. What is called Malcolm Canmore's tower is a mass of shapeless ruins, but the s. wall of the palace of the Stuarts still exists, overhanging the romantic glen of Pittencrief, a noble wreck, with massive flying buttresses. Of the abbey, the frater hall or refectory, and a tower and arched gateway, still remain. The nave of the abbey church, consecrated in 1150, is in the Romanesque style, 106 ft. long, and 55 wide. The choir, built about 1250, a fine example of the first pointed style, was taken down in 1818-21, when it was replaced by what is now the parish church, surmounted by a square tower 100 ft. high, round which is the inscription, in open hewn capital letters, "King Robert the Bruce." Among the other buildings are the Carnegie library, Carnegie baths, St. Margaret's Hall, the Abbey church, high school and corporation buildings. The modern history of D. is chiefly remarkable in connection with the rise of Scottish dissent, Ralph Erskine and Thomas Gillespie having respectively been founders of the Seceder and Relief bodies, now joined under the name of United Presbyterians. The staple trade of the town is damask linen-weaving, which took its rise about the beginning of the eighteenth century. There are establishments for the spinning of linen yarn, and several large factories where steam and hand loom weaving is carried on. There are likewise large collieries and lime-works, iron foundries, breweries, dye-works, and fire-clay works. See **DAMASK**. The public buildings are town-house and county buildings, each having a spire, and the prison, poor-house, and music hall. Pop. of parish, '71, 23,313, of which the town contained 14,963. Pop. of borough, '81, 17,085; '91, 19,647.

DUNFISH, codfish cured so that they have a dark or dun color. They are split and partially salted, piled away in a dark place, covered with eel-grass, and pressed. The process gives them a peculiar flavor.

DUNGANNON, a municipal borough in the east of Tyrone, near a tributary of the Blackwater, 11 m. n.n.w. of Armagh, and 8 m. w. of lough Neagh. It lies on a hill-slope, in a densely peopled district, with high mountains to the west.. It is well built, and consists of a square with diverging streets. In the vicinity are the largest lime-quarries and collieries in Ulster. The chief manufactures are linen, coarse earthenware, and fire-brick. Pop. '91 about 4000. Till 1885 it was a parliamentary borough, sending one member to parliament. It was the chief seat of the O'Neils, the kings of Ulster, till 1607. Its castle was destroyed by the parliamentary forces in 1641.

DUNGARVAN, a municipal borough, seaport, and bathing-place, Waterford co., Ireland, 25 m. w.s.w. of Waterford. Until 1885 it was also a parliamentary borough. The pop. in '81 was 7,377, chiefly engaged in hake, cod, herring, and other fisheries; pop. in '91, 5263. The chief exports are grain, butter, cattle, and fish. D. has the remains of an Augustinian abbey founded in the 7th c. by St. Garvan. It has, besides, the remains of walls built by king John, who also built the castle, now used as barracks. — Dungarvan bay is 3 m. wide, about the same in length, and 1 to 5 fathoms deep.

DUNG BEETLE, the common name of many coleopterous insects of the tribe *scarabæides*, which feed upon the dung of animals, and for the most part live in it. They are found in all parts of the world. Many of them belong to the section of *scarabæides* called *coprophagi* (Gr. dung-eaters); but others, as the **DOR**, or **SHARD-BORN BEETLE** (*geotrupes stereorarius*), to the section called *arenicoli* (Lat. sand-dwelling), distinguished by peculiarities in the antennæ, mandibles, etc. Neither section, however, consists exclusively of insects entitled from their habits to be called dung beetles, some of the *coprophagi* feeding chiefly on marine vegetables in a state of putrescence, and some of the *arenicoli* on the roots of plants. The **DOR** is one of the most common British beetles; it is of a stout form, less than an inch long; black, with brilliant metallic and blue reflections on the under surface; it may often be heard droning through the air towards the close of the summer twilight, and finds its way with rapidity and certainty to cow-dung, on which it feeds, and under which it burrows, making a large cylindrical hole, often of considerable depth, and depositing therein its eggs, enveloped in a mass of dung. These habits—more or less modified—are shared by many other species, which thus not only hasten the removal of what would otherwise become offensive on the surface of the ground, but even distribute it in the soil, where it affords nourishment to plants.—The sacred beetle or scarabæus (q.v.) of the Egyptians (*scarabæus sacer*, or *ateuchus sacer* of modern entomologists) is a true **D. B.**, one of the *coprophagi*, in size and color much resembling the dor. It is found not only in Egypt, but in the s. of Europe and w. of Asia, and deposits its eggs in dung, which it rolls into little balls for the purpose. A nearly allied insect (*gymnopleurus pilularius*), a native of North America, is known as the **TUMBLE-DUNG BEETLE**, from its habit of rolling globular pellets of dung to the place where they are to be buried in the earth. Several individuals sometimes combine their strength in this curious operation, which is performed by the hind-feet pushing backwards.—The dor, and some other dung beetles, simulate death to deceive their enemies when they apprehend danger, not, like many insects, by contracting their bodies as much as possible, and drawing in their legs, but by stretching every part out to the utmost, and rigidly fixing themselves in that position. See *illus.*, **BETLES**, ETC., vol. II.

DUNGEON. See **DONJON**.

DUNGNESS is the name of a headland in England, projecting into the English channel, and forming the southern extremity of Kent. It is situated some ten miles south-east of Rye, and has a fort and a light-house.

DUNGLISON, **ROBLEY**, LL.D., 1798-1869; b. England, educated in Germany, and called to the chair of medicine in the university of Virginia; afterwards professor in the university of Maryland, and in the Philadelphia medical college. He was a diligent student, and enjoyed a high reputation for benevolence. He was the author of a large number of excellent medical books, among which are a *Medical Dictionary* and *Therapeutics and Materia Medica*. The dictionary is a standard work of its class.

DUNKELD, a small village in the e. of Perthshire, 15 m. n.n.w. of Perth. It lies in a deep romantic hollow, on the great e. pass (of Birnam) to the Highlands, on the left bank of the Tay, across which it communicates with the s. by a handsome bridge, built in 1809 by the duke of Athole. It is environed by dark-wooded and craggy mountains. D. is a place of great antiquity, dating probably from the 7th or 8th century. About the year 1130, king David I. made it the seat of a bishopric, of which the Culdees of the ancient abbey were the chapter. The choir of the cathedral, chiefly in the first pointed style, was built between 1318 and 1337; the nave, in the second pointed style, was built between 1406 and 1464; and the tower and chapter-house, also in the second pointed style, were built between 1470 and 1477. The choir is now the parish church. The nave, which is in ruins, contains one or two ancient monuments.

DUNKERS, or **TUNKERS**. See **BAPTISTS**, **GERMAN**.

DUNKIN, **CHRISTOPHER**, was born in 1811, educated at the universities of Glasgow and London. Coming to the United States, he taught Greek for a time at Harvard, but soon moved to Canada. There he edited the *Montreal Chronicle*, and entered law and politics, becoming assistant secretary for Lower Canada in 1847, minister of agriculture in 1869, and puisne judge in 1871. He died 1880.

DUNKIRK, city and port of entry, in Chautauqua co., N. Y., on lake Erie, reached by the Lake Shore and Michigan Southern and other railroads; 40 m. s.w. of Buffalo. It has a good harbor, and a large lake trade by steam and sailing vessels. In the city are an opera house, numerous churches, an orphan asylum, a monastery, a public hall, Holly system of waterworks, electric street railroads, the extensive repair-shops of the Erie railroad, locomotive works, iron works, and other factories. There is direct communication with the coal, iron, and oil regions of Pennsylvania. Pop. '90, 9416.

DUNKIRK, or **DUNKERQUE**, the most northerly seaport and fortified t. of France, stands on the eastern shore of the strait of Dover, in the department of Nord, its distance from Paris being in a direct line about 155 m. n., and from Lille about 43 m. n.w. The town, which is connected by railway and canal with the principal manufacturing centers of Belgium and France, is surrounded by ramparts and ditches, and is defended

by a citadel. It is well built, the streets spacious and well paved, the houses chiefly of brick. Its quay and pier, its church of St. Eloi—a Gothic structure, having a handsome though rather incongruous frontispiece in its Corinthian portico—its town-hall, barracks, college, and theater, are the principal architectural features. The harbor of D. is shallow, and the entrance difficult, but the roadstead is large and safe. D. has manufactures of soap, starch, beer, beet-root sugar, cordage, and leather; also metal foundries, distilleries, salt refineries, and ship-building yards. Forming as it does the outlet for the great manufacturing department of Nord, its trade by sea is very considerable. Since becoming a free port, it has also carried on a good trade in wine and liquors. Its cod and herring fisheries are actively prosecuted. The immediate vicinity of D. has a dreary and uninteresting appearance. Pop. '86, 38,004; '91, 39,498; '96, 39,718.

D. is a place of considerable historic interest. It owes its origin, it is said, to the church built by St. Eloi in the 7th c., in the midst of a waste of sand-hills or dunes, and hence its name, "Church of the Dunes." D. was burned by the English in 1388, taken by them under Oliver Cromwell in 1658, but sold to Louis XIV. by Charles II. for a sum of money in 1662. By the treaty of Utrecht in 1715, the French were compelled to destroy the fortifications of D., which were again restored, however, in 1783. In 1793, the allies under the duke of York laid siege to D., but were compelled by the French to retire, after having suffered severely. D. was made a free port in 1826.

DUNKLIN, a co. in s.e. Missouri, on the Arkansas border; 500 sq.m.; pop. '90, 15,085, with colored. The surface is mostly prairie and swamp, with moderate fertility. Agriculture is the chief business. Co. seat, Kennett.

DUNLAP, WILLIAM, 1766–1839; b. N. J.; a painter and author. His early life was devoted to painting, interspersed with literary and theatrical work. He wrote a number of plays, and published a *History of the American Theater*; *Arts of Design in the United States*; and a *History of the New Netherlands*. He was one of the founders of the New York academy of design.

DUNLIN, or **PURRE** (*tringa alpina*, *T. cinclus*, or *T. variabilis*), a bird of the family *scelopacidae* (snipes, etc.), and of the large group to which the names sandpiper and stint are variously given. It is not quite 9 in. in length from the extremity of the bill to that of the tail. The plumage undergoes great variations in summer and winter. It is a very widely diffused bird, being found both in Europe and America.

DUNLOP, GEORGE KELLY, D.D., b. 1830; ordained priest in the Prot. Epis. church, 1856; was rector of Grace church, Kirkwood, Mo.; prof. of Latin and Greek at the Masonic coll., Lexington, Mo.; was consecrated missionary bp. of N. Mex. and Arizona, 1880; died March, 1888.

DUNMORE, a borough in Penn., Lackawanna co., near Scranton; pop. '90, 8315. Coal mining is the chief business.

DUNMOW FLITCH or **BACON**, a prize instituted at Dunmow, in Essex, in 1244, by Robert de Fitzwalter, on the following conditions: "That whatever married couple will go to the priory, and kneeling on two sharp-pointed stones, will swear that they have not quarreled nor repented of their marriage within a year and a day after its celebration, shall receive a flitch of bacon." The prize was first claimed in 1445, two hundred years after it had been instituted. After 1751, up to which date only five presentations had taken place, the flitch was not again claimed till 1855. The tenth occasion of awarding the flitch occurred in 1876.

DUNN, a co. in n. western N. Dakota, formed 1883 from part of Howard; 1152 sq.m.; pop. '90, 159. It is watered by the Little Missouri and Big Knife rivers.

DUNN, a co. in n.w. Wisconsin on Chippewa and Red Cedar rivers; 860 sq.m.; pop. '90, 22,664. Productions, grain, hay, butter, etc. Co. seat, Menomonie.

DUNNAGE, on shipboard, is a name applied to miscellaneous fagots, boughs, bamboos, old mats or sails, and loose wood of any kind, laid in the bottom of the hold to rest the cargo upon; either to keep the ship in trim or to preserve the cargo from damage by leakage.

DUNNELL, MARK H., b. Me., 1823; graduated from Waterville coll., 1849; was a member of the Me. legislature and senate; and for a number of years was state supt. of common schools. He served as a col. in the civil war; was U. S. consul at Vera Cruz, Mexico; was a member of the Minn. legislature, 1867. He was elected as a republican from Minn. to the XLII and five succeeding congresses and to the LIst.

DUNNET HEAD, a rocky peninsula, 100 to 600 ft. high, the most northerly point of Scotland, on the n. coast of Caithness, in lat. 58° 40' n., and long. 3° 21' west. It consists of upper old red sandstone, resting on the middle flagstone of the same system.

DUNNING, JOHN, Lord **ASHBURTON**, 1731–83; an English lawyer. His fame began in 1762 with his *Defense of the United Company of Merchants of England trading to the East Indies*, and their Servants, particularly those at Bengal, against the *Complaints of the Dutch East India Company to his Majesty on the Subject*. In 1763, he further distinguished himself in the defense of John Wilkes, whose cause he conducted throughout. In 1766, he was chosen recorder of Bristol, and the next year was appointed solicitor-general. After 1771, he was in the opposition, making many powerful speeches in parliament. In

1782, he was appointed chancellor of the duchy of Lancaster, and about the same time was raised to the peerage.

DUNNOCK. See HEDGE-SPARROW.

DUNNOTTAR CASTLE, the ancient seat, now in ruins, of the Keiths, the earls marischal of Scotland, on the Kincardineshire coast, a mile and a half s. of Stonehaven. It occupies the top of a rock 3 acres in extent, and 160 ft. high, overhanging the sea, with a deep though dry chasm between it and the mainland, and it is approached by a steep winding path. In 1296, Wallace is said to have taken the rock and the kirk of Dunnottar from the English. During the commonwealth, the regalia of Scotland were hid in the castle from the republican army, and before the garrison surrendered to Cromwell's troops in 1651, the regalia were removed and secreted in the church of Kinneff, by Mrs. Grainger, the minister's wife. In the times of James II. and Charles II., D. C. was one of the state prisons, where the Covenanters were confined. It was dismantled after the rebellion of 1715, on the attainder of the last earl marischal.

DUNOIS, JEAN, called the Bastard of Orleans, count of Dunois and Longueville, one of the most brilliant soldiers that France ever produced, was b. in Paris in 1402. He was the natural son of Louis duke of Orleans, brother of Charles VI., and was brought up in the house of that prince along with his legitimate children. D. is said to have been intended for the church, but this is doubted. His first important military achievement was the overthrow of the English at Montargis (1427). He next threw himself into Orleans with a small body of men, and bravely defended the place till the arrival of the famous Joan of Arc, whose religious enthusiasm combined with the valor of the bastard raised the drooping spirits of the French, and the English were obliged to raise the siege. This was the turning-point in the fortunes of the French nation. In 1429, D. and the maid of Orleans won the battle of Patay, after which he marched, with a small body of men, through the provinces then overrun by the English, and took the fortified towns. The capture and death of Joan of Arc arrested for a moment the progress of the French arms, but the heroism of D. was irresistible. He took Chartres, the key of Paris, forced Bedford to raise the siege of Lagny, chased the enemy from Paris, and within a very short period deprived them of all their French conquests except Normandy and Guienne. The next grand series of successes on the part of D. was the expulsion of the English from Normandy. Town after town yielded—Rouen, Harfleur, Honfleur, Caen, Falaise, Cherbourg. This splendid campaign lasted only a year and six days. Not less triumphant was his career immediately after in Guienne; Montguyon, Blaye, Fronsac, Bordeaux, and lastly Bayonne, fell into his hands. The English, in fact, were swept out of the country, and the freedom of France from all external pressure permanently secured. Louis XI., on his accession to the throne in 1462, dispatched D. as governor to Genoa, which had yielded itself to France, but soon after, in a fit of jealousy and suspicion, deprived him of all his offices. D. now placed himself at the head of the alliance *Pour le Bien Public*, and by the treaty of Confians, 1465, recovered all his confiscated estates. He died 24th of Nov., 1468. There is no name so popular in France as that of D.; there is no hero so national; he labored 25 years for the deliverance of his country, and this *alone*—his sword was never unsheathed, except against the English. He never had a force under him which could enable him to win a victory that might balance Agincourt or Crécy, but the multitude and constancy of his petty successes served the cause of France more effectively than great and sanguinary contests would have done.

DUNOON, one of the most frequented sea-bathing places and summer residences in the w. of Scotland, is situated in the s.e. of Argyshire, on the w. side of the firth of Clyde, 9 m. w. of Greenock. A village existed here from a very early date, but a new well-built town, with fine villas around, has of late years sprung up. The pop. of D. in 1891 was 5285. Dunoon castle, of which only a small part now remains, stood on a conical hill near the pier, and was once a royal palace and strong fortress. The Argyle family once lived here, but the building became a ruin about 1700.

DUNS, a burgh of barony in the Merse, in the middle of Berwickshire, the largest t. in the co., on an eminence on the Whitadder, 44 m. s.e. of Edinburgh, and 13 w. of Berwick-on-Tweed. Pop. '91, 2198. To the n. of the town is Duns Law, 630 ft. high.

DUNSINNANE, one of the Sidlaw hills, in the e. of Perthshire, 1114 ft. high, 7 m. n.e. of Perth, and looking towards Birnam hill (q.v.). On the top are the remains of the rampart and fosse of an ancient fortification, popularly called Macbeth's castle.

DUNS SCOTUS, one of the most famous and influential of the scholastics of the 14th century. His history is involved in considerable obscurity. England, Scotland, and Ireland all contend for the honor of having given him birth, but without anything to offer in support of their respective claims beyond inference from his name. As to the date of his birth, all that can be said is, that it was in the last half of the 13th century. Whatever was the history of his youth, he entered early the order of Franciscans, studied at Oxford, and soon became professor of theology. His prelections were attended by crowds of auditors, the number of students at Oxford then exceeding 30,000. About 1304, he removed to Paris, then the chief seat of scholastic philosophy, where he taught

theology with great applause. He was especially distinguished for the zeal and ability with which he defended the immaculate conception of the Virgin against Thomas Aquinas. He is said to have demolished 200 objections to the doctrine, and established it by a cloud of proofs. It continued long a point of dispute between the Scotists and Thomists; and it was only in 1854 that the dogma was by papal authority declared a necessary doctrine of the Catholic faith, which it is now heresy to deny. In 1308, D. S. was called to Cologne to oppose the heresies of the Beguin brethren, and there he suddenly died, in the 34th or 43d year of his life. D. S. was mostly opposed to Thomas Aquinas in theological opinions, and held very tenaciously the doctrine of the absolute freedom of the human will, from whose spontaneous exercise he derives all morality. He was a realist in philosophy, and his followers are on that ground opposed to the Occamists, who were nominalists. See the article NOMINALISM. He defended his opinions in the style of dialectic then in vogue, and with an acuteness that got him from his contemporaries the name of Doctor Subtilis. When, however, at the revival of learning, the followers of Duns, or *Dunsmen*, saw that the hair-splitting style of reasoning was going out of fashion, they "raged," as old Tyndal says, "in every pulpit" against the new classic studies, so that the name gradually came to signify not only one opposed to learning, but one slow at learning; hence our word *dunce*, a blockhead. It would be difficult to indicate the nature of his speculative opinions without entering into particulars, nor are his writings as yet sufficiently known and explored for the formation of a decided judgment. The most famous of his works, besides his commentaries on the Bible and on Aristotle, is his Commentary on the Sentences of Peter Lombard, called the *Opus Oxoniense*, of which the *Opus Parisiense* is an abridgment. The chief edition of his works is that of Luke Wadding (12 vols., Lyons, 1639), but it is by no means complete. The controversies carried on so long between the Scotists and Thomists owed their bitterness not so much to zeal for science and religion, as to the jealousy existing between the Franciscans and Dominicans.

DUNSTABLE, a t. in the s. of Bedfordshire, at the e. base of the Chiltern chalk-hills or Dunstable downs, 18 m. s.s.w. of Bedford. It chiefly consists of one main street crossed by another. The houses are mostly of brick, some of them very old. Pop. '91, 4513. D. is the chief seat of the British straw-plait manufacture, which employs many women. Whiting is also made. In winter, many large larks are caught in the neighborhood, and sold chiefly in London as an article of luxury. Henry I. founded here a priory of black canons, of which the present parish church is a part. D. was in 1110 the scene of some of the earliest theatricals, the subject being the miracles of Catherine, by abbot Geoffry of St. Albans.

DUNSTAN, SAINT, was b. at or near Glastonbury, in Somersetshire, 925 A.D. He was of noble birth, and is said to have been remotely related to the royal family, as well as connected with the church through influential relatives. His early studies, which he pursued with extraordinary assiduity, were superintended by Irish teachers; but besides his professional learning, D. possessed a variety of accomplishments. He was an excellent composer in music; he played skillfully upon various instruments; he was a painter, a worker in design, and a calligrapher; a jeweler, and a blacksmith. While quite a youth he was presented at the court of king Athelstan, who seems to have been delighted with his music; but the courtiers envying the favor of the sovereign, denounced him as a dealer in sorcery, and procured his expulsion from court. D. now began to figure in a new character. Contiguous to the church of Glastonbury, he erected a cell, 5 ft. in length by 2 in breadth, the floor of which was sunk beneath the surface, while the roof, on the outside, was only breast-high, so that he could stand upright in it, though unable to lie at full length. This was at once his bed-chamber, his oratory, and his workshop. It was here that (according to the monkish legends) he had his most celebrated contest with the devil. One evening, while the saint was employed at his forge, the devil thrust his head in at the window, and began to tempt him with some immoral propositions. D. patiently endured the annoyance until his tongs were red hot in the fire, when, snatching them suddenly up, he seized the foul fiend by the nose, and held him till the whole neighborhood resounded with the clamor of his agony. Gradually, D. acquired a great reputation for sanctity; and on the accession of Edmund to the throne in 940, he was recalled to court; but in spite of the exploits and penances which had made his banishment illustrious, he was still opposed by the courtiers, who saw his ambition, and dreaded his talents. A second time D. was dismissed, but the king made him abbot of Glastonbury, and increased the privileges of that monastery. Edred, nicknamed *debilis pedibus* (weak in the feet), who succeeded Edmund in 946, showed D. great favor. The saint now began to distinguish himself as a statesman, and the vigorous policy of Edred's reign is affirmed to have proceeded from the inspiration of Dunstan. If such was the case, then to D. was owing the complete subjugation of the Northumbrian Danes. Edred was succeeded by Edwy in 955, who detested D., and not without reason, for the saint, on the day of Edwy's coronation, had grossly insulted his wife and her mother. Besides, Edwy had long suspected D. of peculation in his charge, and this outrage made his wrath overflow. D. was deprived of his clerical office, his places at court were taken from him, his so-called reform—viz., of compelling the clergy to become celibates—was frustrated, the monks were driven out of

their monasteries, their functions handed over to the secular clergy, and D. himself was banished. He fled to Flanders, narrowly escaping having his eyes put out by the messengers whom the infuriated king had sent after him. After D.'s flight, a rising took place among the Northumbrian Danes, instigated by Odo, archbishop of Canterbury, himself a Dane, and a friend of the expatriated saint. Edgar, the brother of Edwy, was chosen king of the whole of the island n. of the Thames, and D. returned in triumph from his brief exile. Meanwhile, Edwy's beautiful wife, Elgiva, had been seized and murdered, under circumstances of horrid cruelty, by the Mercians, who were armed in the cause of D. and Odo, or, as others say, by the immediate retainers of these churchmen themselves. Edwy himself died of a broken heart, or (according to an old MS. in the Cottonian library) was assassinated, in 958, and was succeeded by his brother Edgar. The latter, as a boy of 15, could exercise little authority: he was long a passive instrument in the hands of D. and his party, who used their power in establishing their cause over the whole island, in enforcing the celibacy of the clergy, and in driving out by main force from all abbeys, cathedrals, and churches, all such married clergymen as would not separate from their wives. At the same time, it cannot be denied that D. and the monks ruled the kingdom with vigor and success, and consolidated the detached states into compacter integrity and union than had ever been known before. The Danish districts of Anglia and Northumbria were divided into earldoms or governments; the fleet of the king was increased to 360 sail, which acted as a most efficient coast-guard, preventing the Norse rovers from making their usual destructive descents on the country. In 960, D. was made archbishop of Canterbury on the death of his friend Odo, when, according to custom, he went to Rome to receive the pall at the hands of the pope. He also induced Edgar to visit in person every part of his dominions annually, when courts of justice were held in the various districts, audiences and feasts given, and appeals heard. The many other beneficial measures of Edgar's reign, such as the reform of the coinage, and the endeavor to extirpate wild animals in the mountainous districts, are generally, and with good reason, attributed to Dunstan. The king, who was zealous for the celibacy of the clergy, was himself one of the most viciously profligate of the Saxon kings; yet D. could wink at his crimes, so long as he himself was allowed to carry out his "religious" schemes. On the death of Edgar, a fierce struggle took place between the partisans of Edward the martyr and his half-brother Ethelred. The cause of the former was espoused by D., who succeeded in placing his favorite on the throne; but the mother of Ethelred, named Elfrida, a beautiful but ferocious woman, caused Edward to be murdered in 979, and D. was compelled to place the crown on the head of Ethelred. The credit and influence of the great monk now declined; his threatenings of divine vengeance were treated with contempt; and soured and exasperated at the triumph of his enemies, he retired to his archiepiscopal city, where he died of grief and vexation, May 19, 988. D. was a man of extraordinary abilities. His vigor, his persistency of purpose, and his stern and unscrupulous disposition, would have elevated him to power in any age; but he possessed, in addition to these qualities, a deep knowledge of the weaknesses of human nature, and a clear and penetrating understanding, which enabled him to see what it was necessary and prudent for a ruler to do. Hence, though despotic to the last degree, he was not blindly so, like a commonplace despot. His ambition was ever under the control of his wisdom and his fixed ideas. But the grand designs of his life—viz., the complete subjection and conformity of the Anglo-Saxon church to that of Rome, and the extension and multiplication of ecclesiastical interests—are not such as excite the admiration of modern times, and all discerning people will regret the success that attended the unpatriotic labors of the saint. That he *was* successful, there can be no manner of doubt. Though personally out of favor at court in the latter years of his life, his efforts to spread his official influence were unceasing. At an early period in his career, he had introduced a new order of monks into the land, the Benedictines, whose strict discipline had changed the character and condition of ecclesiastical affairs, and in spite of the confusion and even opposition thus caused, he persevered to the end. Monasteries continued to be founded or endowed in every part of the kingdom; and such were the multitudes who devoted themselves to the cloister, that the foreboding of the wise Bede was at length accomplished—above a third of the property of the land was in possession of the church, and exempted from taxes and military service. D.'s *Concord of Monastic Rules* will be found in Reyner's *Apostolatus Benedictinorum in Anglia*, fol., Duac. 1626, page 77 of the appendix. Other writings have been attributed to him. See Wright, *Biog. Brit. Lit., Ang.-Sax. Period*. See also William of Malmesbury, Lingard's *History of England*, Kemble's *Saxons in England*, book ii., and *Memorials of St. Dunstan*, edited by W. Stubbs, M.A. (1875), a collection of six biographies of the saint.

DUNSTER, HENRY, d. 1659; b. England; educated at Magdalen college, Cambridge; went to Massachusetts, 1640, and in the same year became the first president of Harvard college. He was esteemed for piety and learning; but was compelled to resign his office, 1654, for having publicly opposed infant baptism.

DUNTON, JOHN, 1659-1733; b. in England, and apprenticed to a bookseller. In 1686, he migrated to New England to sell books. He conducted *The Athenian Mercury*, of which 20 vols. appeared. He was a prolific writer on religion, morals, and politics.

DUODECIMAL SCALE (Lat. *duodecim*, twelve) is the name given to the division of unity into twelve equal parts, as when the foot is divided into 12 in., and the inch into 12 lines; or the pound is divided into 12 ounces. This plan of counting has some advantages, as 12 admits of so many divisions into equal parts—viz., by 2, 3, 4, and 6. But the decimal scale, or division into ten equal parts, is now universally recognized as preferable, from its coinciding with our decimal system of notation.—**DUODECIMALS** is a term applied to a method of calculating the area of a rectangular surface when the length and breadth are stated in feet and inches.

DUODECIMO (Lat. *duodecim*, twelve) is that form of volume whose leaf is equal to the twelfth part of a folio—the folio being the large sheet called the *broadside*, folded once. A book is said to be *quarto*, *octavo*, *duodecimo*, etc., because the sheet of which the pages of the book are made up, has been folded into four, eight, twelve leaves, etc. *Quarto*, *octavo*, and *duodecimo*, are almost always written 4to, 8vo, and 12mo.

DUODENUM. See DIGESTION.

DU PAGE, a co. in n.e. Illinois, traversed by several railroads; 340 sq. m.; pop. '90, 22,551. The soil is very fertile, producing grain and fruit in abundance. Co. seat, Wheaton.

DUPANLOUP, FÉLIX ANTOINE PHILIBERT, b. Savoy, 1802; d. Paris, 1878. In 1825, he was ordained a priest; in 1827, was confessor to the young duke of Bordeaux; next year catechist to the Orleans princes; and in 1830, chaplain to the daughter of Louis XVI. In 1849, he became bishop of Orleans, where he first gave full scope to his plan for Christian education. In 1848, he was instrumental in having the first French expeditionary corps sent to the papal states. He was often in conflict with the censor of public worship in France. He opposed papal infallibility, but was prompt to accept the dogma when it had been promulgated. At the close of the war with Germany he was sent as a representative to the national assembly, where he favored a constitutional monarchy, the restoration of the Bourbons, and a complete system of education. He published a number of works on religious subjects. See *Life*, by Lagrange (1885).

DUPERREY, LOUIS ISIDORE, 1786-1865; a French navigator and scientist, native of Paris. He served under Freycinet in the voyage around the world (1817-20), in charge of the hydrographic operations. In 1822-25, he was in command of a vessel, making scientific explorations in the Pacific and along the coasts of South America. The later portion of his life was devoted to investigations in terrestrial magnetism. He was a member of the French academy of sciences.

DUPERRON, JACQUES DAVY, 1556-1618; a French cardinal. He was brought up a Protestant, but at the age of 20 abjured, and was appointed reader to king Henry III. He became noted as a pulpit orator, and rose to fame and fortune. Soon after Henry IV. came to the throne, Duperron converted him to the Roman Catholic faith, and after the taking of Paris, went to Rome to induce the pope to remove the interdict laid upon the kingdom. In 1604, he was sent to Rome as chargé d'affaires, and within a month was active in the election of two popes—Leo XI. (who reigned 24 days), and Paul V. While at Rome he was made archbishop of Sens, and soon afterwards a cardinal. Duperron was a zealous advocate of papal prerogative, and a man of great ability and untiring energy.

DU PETIT-THOUARS, ABEL AUBERT, 1793-1864; a French naval officer. From 1837 to 1839, he was circumnavigating the globe; rose afterward to be rear-admiral and commanded the Pacific fleet. In 1842, he placed the island of Tahiti under the protection of France, and the same year extended the protectorate over the Marquesas islands. In 1843, when the English missionaries and the natives of Tahiti rose against French rule, he placed the whole Society group under French domination. At the demand of the English government he was recalled. In 1846, he was made vice-admiral, and in 1849, was elected to the legislative assembly. He wrote *A Voyage Around the World*.

DUPIN, ANDRÉ-MARIE-JEAN-JACQUES, a French statesman and lawyer, was b. 1st Feb., 1783, at Varzy, in the department of Nièvre, and studied in Paris. In 1815, he was elected a member of the chamber of representatives, when he opposed the motion for proclaiming Napoleon II. successor to the throne. During the same year, he published his treatise, *Sur la Libre Défense des Accusés*. The attention excited by this work procured him the honor of defending Marshal Ney, and afterwards the English officers Wilson, Bruce, and Hutchinson, accused of having favored Lavalette's escape. He had also the honor to defend the poet Béranger in 1821. From 1825 to 1829, he was the advocate of the liberal party. In his pamphlet, *La Révolution de 1830*, he endeavored to prove the legal character of this revolution; and on the question being mooted whether the new king should assume the title of Philippe VII., D. declared "that the duke of Orleans was called to the throne not because he was a Bourbon, but although he was a Bourbon, and on the condition that he should not follow in the footsteps of his predecessors." After having been appointed to various important offices by the new government, D. found it necessary to pass over to the opposition, and was eight times chosen president of the chamber of deputies. On the revolution of 1848, he urged (but unsuccessfully) the chamber to proclaim the comte de Paris king of the French,

with the duchess of Orleans regent during his minority. In consequence of the confiscation of the Orleans estates in 1852, D. resigned his place, and retired for a time from public life; but in 1857, he consented to resume his previous office of *procureur-général* of the court of Cassation. He is the author of many important works, mostly on legal questions, among which may be mentioned his *Manuel du Droit Ecclésiastique Français*, which had the high honor of being censured by the congregation of the *Index* at Rome. In 1853 appeared his *Le Morvan; Topographie, Agriculture, Mœurs des Habitants, Etat Ancien, Etat Actuel*; and in 1857, *Règles Générales de Droit et de Morale tirées de l'Ecriture Sainte*. D. died in 1865.

DUPIN, FRANÇOIS-PIERRE-CHARLES, Baron, a French economist, brother to the preceding, was born at Varzy, in the department of Nièvre, 6th Oct., 1784, and educated at the polytechnic school, Paris. During the empire, he was actively employed as an engineer. Between 1816 and 1819, he made several visits to England and Ireland, to study the great works of construction in those countries. The results of his investigations appeared in his *Voyages dans la Grande Bretagne* (6 vols., Paris, 1820-24, with atlas)—a comprehensive statement of the advantages and defects of British internal administration, exhibiting in a popular form a complete view of the roads, canals, aqueducts, bridges, ports, etc., of this country. D. was about this time appointed member of the *académie des sciences*, and in 1824 was raised to the rank of baron. In 1828, he was elected deputy for the department of Tarn, and he took part with the liberal opposition. After the Feb. revolution of 1848, D. was elected member of the constituent assembly by the department of Seine-Inférieure. After the *coup d'état*, he became a senator of the empire. D. published a multitude of works on geometry, naval affairs, commerce, etc. He died in 1873.

DUPLEIX, JOSEPH FRANÇOIS, 1697-1764; Governor-General of the French establishments in India. He made several voyages to America and India, and displayed remarkable business aptitude. While governor in India his ambition was to extend French possessions, and he was frequently in diplomatic contest and in armed conflict with the English, at the same time endeavoring to win over the native princes. All this was theoretically stopped by the peace of Aix-la-Chapelle; still Dupleix continued his efforts, entering into negotiations for the subjugation of Southern India, and sending troops to the aid of two claimants of the sovereignty of the Carnatic and Deccan, while the English were engaged on the side of their rivals. His scheme failed, but the trouble continued until 1754, when Dupleix was recalled to France. He died in obscurity and want.

DUPLICATE RATIO. See PROPORTION.

DUPLICATION OF THE CUBE. See DOUBLING THE CUBE.

DUPLIN, a co. in s.e. North Carolina, watered by a branch of Cape Fear river, and intersected by the Atlantic Coast line railroad; 828 sq. m.; pop. '90, 18,690, includ. colored. The surface is level, and the soil sandy, with some fertile tracts. Productions—corn, rice, cotton, etc. Co. seat, Kenansville.

DUPONCEAU, PETER STEPHEN, LL.D., b. France, 1760; d. Philadelphia, 1844. He was bred to the law, and became secretary to baron Steuben, and with that soldier came to aid the Americans in the revolution. He was with Steuben through the war, and at its close took up his residence in Philadelphia, where, in 1785, he was admitted to the bar. He was offered, but declined, the chief-justiceship of Louisiana. He paid much attention to philology; and in 1819, as chairman of the committee on history, moral science, and general literature of the American philosophical society, he made a report on the structure of the Indian languages. In 1835, the French institute sent him the Volney prize for a similar work. In 1838, he published an essay on the Chinese system of writing. He also wrote on the cultivation of silk, and made efforts to establish its culture in the United States. He wrote on many other subjects, and his contributions to American history were valuable.

DUPONT, JACQUES CHARLES, styled DE L'EURE, a leader of the French liberal party, b. 27th Feb., 1767, at Neubourg, in Normandy. During the periods of the revolution and the empire, he filled several important offices. In 1813, he became a member of the legislative body, and acted as vice-president when this assembly was convoked by Louis XVIII. on the fall of Napoleon. During the Hundred Days he was elected to represent the department of Eure, and, after the battle of Waterloo, became vice-president of the chamber of representatives. After the revolution of 1830, he was appointed minister of justice, but at the end of six months sent in his resignation, and took his place in the ranks of the opposition. After the revolution of 1848, during the session of the 24th Feb., D. took the president's chair, and so far silenced the tumult of the populace, as to render it possible to appoint a provisional government, of which he was proclaimed president. He died in 1855.

DUPONT, PIERRE, 1821-70; b. at Lyons, the son of a workman of Provins. He was brought up by his cousin, who was priest of Roche-Taillée-sur-Saône, and, after leaving the seminary of Largentières, passed a short time in a lawyer's office. In 1839,

he found his way to Paris, where he succeeded in having some of his poems published in the *Gazette de France* and the *Quotidienne*. His first volume of poems, *Les Deux Anges*, appeared in 1841; and in 1847, he made a great hit by his peasant song, *J'ai deux grands bœufs dans mon étable*, which induced him to devote himself to lyrical poetry.

DUPONT, SAMUEL FRANÇOIS, 1803-65; b. N. J.; midshipman in the navy, 1815; lieut., 1826; commander, 1843. In 1845 he commanded Commodore Stockton's flagship in the Pacific squadron, and, during the war with Mexico, did service on the California coast, taking a leading part in the capture of Mazatlan. In 1856 he was made capt. and was sent on special duty to China. When the civil war began, he was in command of the Philadelphia navy-yard. In Sept., 1861, he was appointed flag officer, and given command of the South Atlantic blockading squadron. In Nov., he captured the forts at Hilton Head and Bay Point, the defenses of Port Royal harbor. In 1862, he was made rear-admiral. In April, 1863, he made an unsuccessful attack on Fort Sumter. In the following year, he was retired from active command.

DUPONT DE L'ÉTANG, PIERRE, Count, 1765-1838; a French officer, appointed brigadier in 1793, and gen. of division in 1797. He was with Napoleon at the overthrow of the directory; fought at Marengo; defeated a superior Austrian force at Pozzolo; won further laurels in the Austrian and Prussian campaigns, and, by a singularly bold movement, decided the victory of Friedland. In 1808, he commanded in Spain, where he was compelled to surrender his whole army. For this, he was degraded and imprisoned. On the fall of the emperor, he was restored to liberty and made minister of war, but was soon dismissed. After the second restoration, he became a member of the privy council. He was several times elected to the chamber of deputies.

DUPONT DE NEMOURS, PIERRE SAMUEL 1739-1817; a French statesman and economist, a prolific writer on questions of finance. In 1772, he was secretary of the council of public instruction of Poland. He went back two years afterwards to assist his friend Turgot in the French administration. With Turgot he went into retirement, where he wrote the memoirs of his friend, and translated Ariosto. In 1782, he was employed in constructing the treaty by which the independence of the United States was recognized. Subsequently he was a member of the council of state, and was appointed commissary-gen. of commerce. During the revolution he favored a constitutional monarchy, but was compelled to flee when the republicans triumphed. During his concealment he wrote his *Philosophy of the Universe*. He was found and imprisoned; but as Robespierre's head fell first, Dupont's was saved. He was one of the council of five hundred, and a thorough reactionist. In 1797, his house was sacked by a mob, and he narrowly escaped transportation. Finding France uncomfortable, in 1799 he and his family emigrated to the United States. In 1802, he returned, but declined to receive any political office, except that he was one of the commissioners to arrange the transfer of Louisiana to the United States. Jefferson, whose love of French democratic institutions was only equaled by his hatred of anything English, requested Dupont to prepare a scheme of national education, which was published in French in 1812. The scheme was never adopted in the United States, but some of its features were embodied in the French code. After Napoleon's first downfall, Dupont became secretary to the provisional government, and on the restoration of the Bourbons, he was made a councilor of state. The return of Napoleon caused him to leave France, and he spent the remainder of his life with his two sons, powder manufacturers, in the state of Delaware.

DÜPPEL, or **DYBBÖL**, a small fortified t. of the Prussian province of Sleswick-Holstein, in the peninsula of Sundewitt, 16 m. n.e. from Flensburg. During the war between Germany and Denmark, it was bombarded for more than a month by the Prussians, and finally taken, April 18, 1864. See **DENMARK**.

DUPRÉ, JULES, b. France, 1812; son of a porcelain manufacturer; with Rousseau and others, founder of the modern school of French landscape painters. At first he followed his father's craft, but exhibited at the Salon, 1831; received medals, 1833, and at the Universal exhibition, 1867; chevalier of the Legion of Honor, 1847. His works, which are not numerous, are realistic, "vigorous and full of poetry"; among them are "Water-course in Picardy," and "Sheepfold in Berri." He d. in 1889.

DUPUIS, CHARLES FRANÇOIS, a distinguished French *savant*, was the son of a poor schoolmaster, and was b. at Trie-Chateau, near Chaumont, 16th Oct., 1742. He obtained admission into the college of Harcourt, where he so soon acquired such extensive knowledge that at the age of 24 he was made professor of rhetoric in the college of Lisieux. At the same time he went through a course of law studies, and was admitted an advocate of the parliament. His acquaintance with Lalande introduced him to the study of mathematics and astronomy, and he was led to the thought of explaining mythology by means of astronomy. After several communications in the *Journal des Savans*, appeared his *Mémoire sur l'Origine des Constellations et sur l'Explication de la Fable par l'Astronomie* (Par. 1781). He was now appointed professor of eloquence in the collège de France, member of the académie des inscriptions, and shortly after a member of the commission of public instruction. Although he rather shunned the storms of the revolution, his reputation necessitated his becoming a member of the convention, next of the council of 500, and after the 18th Brumaire, of the legislative body. He was also one of the 48 individuals who formed the nucleus of the institut national. His great work, *Origine de tous*

les Cultes, ou Religion Universelle (12 vols., Par. 1794), which he had long withheld from fear of offending the religious world, was at last published at the instigation of the Cordeliers' club. This circumstance rendered the book more an object of party bitterness than its own purely scientific character would probably have called forth. It made a considerable impression on France at the time, and no doubt originated the famous commission afterwards appointed by Napoleon to explore Upper Egypt, which D. had pointed out as the general source of southern mythology. No less attention was awakened by his memoirs on the origin and spread of the Pelasgi, and on the zodiac of Denderah (q.v.). In his last work, *Mémoire Explicatif du Zodiac Chronologique et Mythologique* (Par. 1806), he attempts to demonstrate the unity of the astronomical and religious myths of all nations. He died 29th Sept., 1809.

DUPUYTREN, GUILLAUME, le Baron, an illustrious French surgeon and anatomist, was b. at Pierre-Buffière, in Limousin, 6th Oct., 1777; educated at the collège de la Marche in Paris; and on the formation of a new school of medicine there in 1794, was appointed to the office of *prosecteur*. In 1801, he was appointed *chef des travaux anatomiques*, and applied himself with intense ardor to pathological anatomy. In 1803, he was appointed assistant-surgeon, and later, in 1815, first surgeon in the Hôtel-Dieu. In 1813, he became professor of surgery to the medical faculty, an office which he exchanged, in 1818, for the professorship of clinical surgery at the Hôtel-Dieu. In 1820, Louis XVIII. conferred on him the title of baron, and in 1823, appointed him royal surgeon. He died at Paris, 8th Feb., 1835. D. possessed extraordinary penetration in diagnosis, a penetration that was generally justified by his bold and skillful operations, and an immovable firmness of nerve. He was the inventor of many ingenious modes of surgical operation and of various surgical instruments. He likewise made several important discoveries in pathological anatomy; and although he wrote very little, almost nothing indeed, he formed a large school of enlightened surgeons in his native country. Among his works may be mentioned *Leçons Orales de Clinique Chirurgicale faites à l'Hôtel-Dieu* (4 vols., Par. 1830-34), published by some of his students; and his *Traité Théorique et Pratique des Blessures par Armes de Guerre*, edited by Paillard and Marx (2 vols., Par. 1834).

DUQUESNE, ABRAHAM, Marquis, one of the most eminent naval officers of France, was b. at Dieppe in 1610, and trained under his father, the captain of a ship, for the naval service. In the war between France and Spain, he brilliantly distinguished himself at Corunna, Tarragona, Barcelona, and other places. During the minority of Louis XIV., when the navy of France was inactive, he entered the service of Sweden, which was then at war with Denmark. D. defeated the Danish fleet near Gothenburg in 1643, was elevated to the rank of vice-admiral, and by a succession of victories over the united fleets of Denmark and Holland, forced Denmark to conclude peace. He then returned to France, where he found the Spaniards prepared to support Bordeaux, which had declared itself for the party of the *Fronde* in 1650. D. immediately collected a squadron at his own expense, and compelled Bordeaux to submit. He was next employed in punishing the pirates of Algiers and Morocco who infested the Mediterranean. On the revolt of Messina against the Spanish government, France sent him to support the insurgents in the Mediterranean. With a small force, D. gallantly opposed the united fleets of Spain and Holland, commanded by De Ruyter, and in April, 1676, completely defeated his enemies off the coast of Sicily, in the vicinity of Mt. Etna. De Ruyter died a few days after. France thus obtained possession of the island of Sicily. Louis XIV. rewarded D. with the title of marquis and a considerable estate. On the revocation of the edict of Nantes, D. was made the only exception to the general decree of banishment issued against all Protestants. His last achievement was the humiliation of Genoa. D. died at Paris, 2d Feb., 1688. See *Duquesne et la Marine de son Temps*, by Henri Plon (Paris, 1872).

DUQUOIN, a city in Perry co., Ill., on the Illinois Central railroad; 77 m. n. of Cairo. It is in a rich agricultural, salt, and coal region, and has a large trade, foundry, machine shops, several coal mines and salt works, park, library, gas-works, national bank, high school, and daily and weekly newspapers. Pop. '90, 4052.

DURA DEN, between Cupar and St. Andrews, in Fifeshire, a small glen through which runs a tributary of the Eden, has become famous on account of the numerous and beautifully preserved fossil fish entombed in its yellow sandstone. This sandstone is one of the upper beds of the old red sandstone. It is developed in D. D. to a thickness of 300 or 400 ft., and is rich in the remains of ganoid fishes. They occur in clusters and detached groups, sometimes crowded together in an extraordinary manner, so that nearly a hundred specimens have been counted on a single slab about five feet square.

DURA MATER, the hard external membrane that envelops the brain. See NERVOUS SYSTEM.

DURA'MEN, or HEART-WOOD, in botany, the inner and fully ripened wood of exogenous trees. The division is often very marked between the *D.* and the *albumen* (q.v.) or sap-wood, the *D.* being more dense and compact, and its tubes thickened and filled with peculiar secretions of the plant, so that juices no longer freely flow through them. It is also very frequently of a darker color than the albumen; in ebony, it is black; and some other trees are remarkable for the peculiar color of their wood, which appears, however, only in the *D.*, and not in the albumen. As timber, it is much more

valuable and durable than the alburnum; and the distinction is as well known to the carpenter or cabinet-maker as to the botanist.

DURAN, AGUSTIN, 1789-1862; a Spanish poet, educated to the law in the university of Seville, and admitted as an advocate. In 1834, he was secretary of the board for the censorship of the press, and soon afterwards had a place in the national library, of which he became a director. He published a discourse on the influence which modern criticism had exercised on the ancient Spanish theater, a number of volumes of old romances, and a collection of old Spanish comedies. He is best known by his poem *The Three Citron Trees of the Orchard of Love*.

DURAN, EMILE AUGUSTE CAROLUS, a French artist who was born in Lille, July 4, 1837. He received his early art education at home, and at the age of twenty went to Paris, where he spent much time at the Louvre. In 1861 he went to Rome, and passed several years there, where he painted among other things, "L'Assasaine," which took a medal. This picture is now in the museum at Lille. After this he spent a year in Spain, and was strongly influenced in his style by Velasquez. His next work of importance was a design for a ceiling in the Luxembourg—"Gloria Mariæ Medicis." His greatest skill, however, is in portraiture. He has painted very many excellent portraits, and is distinguished for vigor, force of coloring, and power of direct realism. Among those worthy of notice are the portraits of Emile de Girardin, Pasteur, the equestrian portrait of Mlle. Croizette, and those of his own daughters. He is also an excellent teacher. He is a chevalier of the Legion of Honor, and of the order of Leopold.

DURANCE, a river in the s.e. of France, rises in the department of the Hautes-Alpes, near the base of Mont Gênevère, one of the peaks of the Cottian Alps. It flows through the department of the Basses-Alpes in a southerly direction; then curving westward, it proceeds towards the Rhone, forming the boundary between the departments of Vaucluse and Bouches-du-Rhone, and joins that river about 3 m. below Avignon. Its principal affluents are the Buech and the Calavon from the right; and the Ubaye, the Bleone, the Asse, and the Verdon from the left. Its total length is about 200 m.—no part of its course is navigable.

DURAND, ASHER BROWN, 1796-1886; b. N. J. He was at first a watchmaker, but in 1812 was apprenticed to an engraver in New York, becoming a partner in the business at the expiration of his time of service. His large engraving of Trumbull's *Declaration of Independence*, which cost him three years of work, brought him into notice, and thenceforward his path was one of success. In 1855, he quitted engraving and turned his entire attention to painting, at first portraits only, but later of natural scenery, in which he was ranked among the first of artists. He was for several years president of the New York national academy of design. He translated several works on art.

DURANGO, a state in n. Mexico, s. of Chihuahua, and w. of Coahuila; 38,009 sq. m.; pop. '95, 294,366. The w. part is mountainous, but the e. is level and fertile. In the n.w. is a large and desolate area inhabited only by Indians. The climate is cold on the mountains, but generally temperate on the plains. Sugar cane, tropical plants and fruits, cotton, flax, wheat, and other cereals are grown. There are many rich gold mines; some deposits of silver; and copper and lead are abundant. The chief town is the city of the same name.

DURANGO, sometimes called CIUDAD DE VICTORIA, or GUADIANA, a city of Mexico, capital of the state of Durango, near the foot of the s. slope of the Sierra Madre, 7295 ft. above the sea-level; pop. '95, 42,165. The city was founded in 1559 by Alonzo Pacheco as a military post for the control of the natives. It is the centre of a Roman Catholic bishopric, and has a cathedral, churches, government buildings, etc. The city is well supplied with water by warm and cold springs. It has trade with the adjoining states, and contains various manufactories. Near by is the famous Cerro del Mercado, a hill about 600 feet high, composed of iron ores.

DURANT, HENRY FOWLE (originally Henry Welles Smith); 1822-81; b. N. H.; d. Mass.; fitted for college with Mrs. Ripley, at Waltham; graduated at Harvard, 1841; read law and practiced with his father in Lowell; moved to Boston and was law-partner of Joseph Bell; was often Rufus Choate's junior counsel, and gained great prominence in the profession. He married, 1854, Pauline Adeline Fowler. Mr. D. abandoned the law, 1863; and devoted himself to Christian work, becoming a lay-preacher (1865-74); founded Wellesley college, 1871, giving it in all an amount variously estimated at from one to two million dollars.

DURAN TE, FRANCESCO, 1684-1755; an Italian composer, and one of the founders of the Neapolitan school of music. He was chapel-master in Naples, and in 1742 was at the head of the Conservatorio Santa Maria di Loreto in that city. He had unexampled fame as a teacher, and the most celebrated masters of the earlier school of Italian opera were among his pupils. Under Durante the Neapolitan school reached the climax of its celebrity, and it was in this school that the great traditions of Italian vocal art were established. As a composer he adhered to the severe style of the early Italian masters.

DURAZZO (called by the Turks *Dratsch*, and by the Slaves *Durtz*), a maritime t. of Albania, European Turkey, is built on the rocky peninsula of Peli, in the Adriatic. Lat. 41° 19' n., long. 19° 27' east. It is fortified, and is a place of considerable antiquity.

Its situation in a fertile district gives it an export trade in grain, oil, etc.; but in recent years, owing to partial failures in crops, and disease in olives, the exports have been small. D. has large imports of British manufactured goods; and also of sugar, coffee, rice, soap, and iron. Its pop. is under 5000.

D. is the ancient *Epidamnus*, which was founded about 627 B.C. by a conjoined band of Coreyreans and Corinthians under one Phaleus, a Heracleidan. It became a great and populous city, but was much harassed by internal party strifes, which ultimately led to the Peloponnesian war (q.v. under GREECE). Under the Romans it was called *Dyrrachium* (whence its modern name), and became the seat of a Roman colony, and an important landing-place for those sailing from Brundisium in Italy to Greece. Here Pompey was for some time beleaguered by Cæsar. Dyrrachium attained its highest consequence about the end of the 4th c., when it became the capital of the Byzantine eparchy of New Epirus. After being possessed successively by the Ostro-Goths, the Bulgarians, the Normans, and the Venetians, and been destroyed by an earthquake, it was finally conquered by the Turks in 1502, in whose possession it still remains.

D'URBAN. See NATAL.

DURBAR (Persian, *darbâr*, court, audience), a *levee* held by the governor-general of India, or by one of the native princes. The most noted durbar was that of Lord Lytton, at Delhi, January 1, 1877, when Queen Victoria was proclaimed Empress of India.

DURBIN, JOHN PRICE, D.D., 1800-76; b. Ky. At an early age he entered the Methodist itinerant ministry, studied while preaching, graduated at Cincinnati college, and was made professor of languages in Augusta college, Ky. In 1831, he was chaplain to the U. S. senate; in 1832, editor of the *Christian Advocate and Journal*; in 1834, president of Dickinson college; subsequently traveled in Europe, and in 1844 was prominent in the great slavery discussion which divided the church. He left the college in 1845, and was pastor in Philadelphia and presiding elder of the district. From 1850 to 1872, he was secretary of the missionary society, and to his exertions that society owes much of its success. He published *Observations in Europe, principally in France and Great Britain*, and a similar work on Palestine, Syria, and Egypt.

DÜREN (the Roman *Marcodurum*, whence its former name, Mark-Duren), an ancient t. of Rhenish Prussia, situated on the Roer, 18 m. e. of Aix-la-Chapelle. It is surrounded with walls, and has several churches remarkable for their fine architecture. D. has manufactures of woolen cloths, iron and steel ware, paper, soap, leather, oil, etc. In the vicinity are iron foundries and other factories worked by water-power, obtained from the Roer. Pop. '90, 21,551. Here Charlemagne, on his way to attack the Saxons, held diets in 775 and 779 A.D. After an obstinate resistance, D. was taken and burned by Charles V. in 1543.

DÜRER, ALBERT, the father of the German school of painting, "the prince of artists," as his countrymen loved to call him, was born at Nürnberg in 1471, according to an entry in his father's day-book, "on the day of St. Prudentius, on a Friday of the holy week." His father was a humble pious goldsmith, of whom the great painter said: "His daily speech to us was, that we should abound in love to God, and act faithfully towards our neighbor." D. was carefully educated and instructed by his father in the goldsmith trade, and at 15 executed a piece of work in chased silver representing the seven "falls of Christ"—in reference to the tradition that Christ fell seven times while bearing his cross to Mt. Calvary. Even as a child, drawing was his delight, and he was wont to astonish by the exactness with which he drew parts of the human body, and even whole figures, also lines and circles at the first stroke, without ruler or compass. His father therefore bound him apprentice, in 1486, to Michael Wohlgemuth, the chief Nürnberg artist, with whom he served three years. From 1490 to 1494 he traveled in Germany and the Venetian states; and on his return, his father "bargained" with Hans Frei, a skillful mechanic of Nürnberg to give him to wife his daughter Agnes, who turned out a perfect Xantippe, with nothing to recommend her but beauty and 200 florins, who embittered the whole course of his life, and, as his life-long friend Pirckheimer asserts, hastened his death. After receiving his diploma with all the honors and rights of a master, obtained for his famous drawing of Orpheus, he went to Venice in 1505, where he painted a picture of the martyrdom of St. Bartholomew, and one of Adam and Eve, afterwards bought for the gallery at Prague. He also visited Bologna, where it is said that he met with Raphael, who esteemed him highly, and that each painted for the other his portrait. After this journey, his fame spread widely, and the Emperor Maximilian appointed him court painter, with an annuity of 100 florins; and Charles V. confirmed the same in a document still to be seen in the Nürnberg archives. In 1520, he visited the Netherlands with his wife and their maid-servant; and they were splendidly entertained at Antwerp and Bruges by the painters, a costly dinner being served on vessels of silver, the whole party conducting them home late in the night by the light of many torches. His expenses were often defrayed at the inns, and he was escorted free from city to city. He says in his journal: "The people did obeisance unto me as if they were leading some great lord." D. warmly embraced the doctrines of the Reformation; and his journal contains a long lamentation and prayer on hearing that Luther had been carried off to the castle of Wartburg. At Antwerp he records: "I was now overcome by a strange sickness, of which I never yet heard from any man."

This was in 1521, and the "strange sickness"—no other than consumption—took yet seven years to consume his strong frame; he d. in his native city, 6th April, 1528, in his 57th year.

D's facility was almost incredible. He *thought out* his works, and then executed them without sketch, and never altered a line. Of his coloring, Fuseli says: "Dürer excelled Raphael in juice and breadth of coloring as much as Raphael excelled him in every other quality." His drawing was perfect. So quaint were the presentments of his genius, he may be called the Chaucer of painting. In his portraits, he not only caught the expression, but delineated character and passion. D. was the inventor of the art of etching. He found wood-engraving in its infancy, and raised it to be a pattern for all times; he also discovered the method of bringing out wood-cuts in two colors. Historical and other paintings by D. are to be seen at Vienna, Munich, Prague, Dresden, and Nürnberg. The oldest of his pictures extant is the portrait of himself of the year 1498, in the Florentine gallery. His engravings and wood-cuts are so numerous, that with all his surpassing diligence it is known that for many of them he only gave the designs: 262 wood-cuts are known marked with his name, the most famous of which are the "Great Passion," the "Little Passion," his favorite work, the "Revelation of St. John," and the series called the "Triumph of Maximilian," a copy of which is in the Advocates' Library in Edinburgh. In the British museum, there is a volume with more than 200 original drawings by D., formerly in the collection of sir Hans Sloane, also an exquisite carving in hone-stone, of the birth of St. John, and a number of engravings, bequeathed by Mr. Nollekens. His own list of his works enumerates 1,254 pieces.

In the last three years of his life he published works on perspective and measurement, on fortification, and on human proportion, of which last he only lived to correct the first volume. His life has been written by Heller, Roth, Campe, and others; in English by W. B. Scott and Mrs. Heaton. Deeply religious and reverent, he was also of a cheerful temperament, and was long chief magistrate of his native t., where there is a brass statue of him, designed by the famous sculptor Rauch, and his house is still to be seen at the corner of a street called by his name. See illus., CORREGGIO, ETC., vol. IV.

DURESS is a legal term, signifying personal restraint, or fear of personal injury or imprisonment, imposed upon a person to constrain him to perform some act injurious to himself or another; as when a man's life is threatened or his liberty restrained to compel him to sign a bond, or to relinquish some right, or to commit a misdemeanor. A bond signed under D. is voidable in law. The same is the case when the violence or the threat thereof is exercised on the wife, or husband, or other near kindred of the contracting party. The violence or threats must be such as are fitted to operate upon a person of ordinary firmness and to inspire a genuine fear. If a man's goods be in D.—that is unlawfully detained—and he pay money under protest to release them, a suit will lie for its recovery.

DURFEE, JOE, LL.D., 1790–1847; b. and d. in R. I. He graduated at Brown university in 1813; studied law; was elected to congress in 1820, and served four years; was chosen a number of times to the state legislature, and in 1828 was speaker of the lower house. In 1833, he was appointed associate justice of the state supreme court, and became chief-justice in 1835. He was the author of *What Cheer*, a poem in nine cantos, and of *Panidea*, a treatise to prove the presence of God throughout all nature.

DUR'FEY, THOMAS, a writer of plays and poems in the reign of Charles II., with whom he was a favorite for his wit, liveliness, and songs. In literature, he is best remembered for his collection of songs, entitled *Pills to Purge Melancholy*, a work found only among the rarities of private libraries. Tom D., as he was usually called, lived to entertain queen Anne by singing his catches and glees; but being without any settled means of support, he concluded his career in poor circumstances. Addison, who was his friend, pleaded in his behalf—"He has made the world merry, and I hope they will make him easy, as long as he stays among us. This I will take upon me to say, they cannot do a kindness to a more diverting companion, or a more cheerful, honest, good-natured man." He died at an advanced age in 1723.

DURGA. See **UMA**.

DUR'GA PU'JA. See **UMA**.

DURHAM, a co. in northern N. Carolina, formed in 1881; 292 sq.m.; pop. '90, 18,041. Co. seat, Durham.

DURHAM, a co. in Ontario, dominion of Canada, on lake Ontario, intersected by the Grand Trunk and Midland railroads; 620 sq.m.; pop. '81, 36,427. Chief town, Port Hope.

DURHAM, a maritime co. of the n.e. of England, between the Tyne and Tees, bounded n. by Northumberland, e. by the German ocean, s. by Yorkshire, w. by Cumberland and Westmoreland. It is 48 m. long, by 39 broad, with 32 m. of coast, generally low, but with some cliffs; area, 973 sq.m., five sevenths being arable. The surface is hilly, and slopes to the east. In the w., which is waste but rich in minerals, are branches of the Pennine chain, rising in Kilhope law, 2,196 ft.; Colber law, 1678; and Pontop pike, 1018. The two chief branches inclose the valley of the Wear, and send forth several parallel ranges, declining toward the coast, and inclosing many fertile

tracts and sheltered valleys. The chief rivers are the Wear, Tyne, and Tees, navigable respectively for 12, 15, and 10 miles. The rocks are new red sandstone, magnesian limestone, millstone grit, carboniferous limestone, rich in lead; and coal-measures, forming the valuable D. coal-field, 25 by 10 m., with many faults, and with about 40 beds of coal, 3 to 10 ft. thick. Basalt and greenstone trap dikes intersect the w. part of Durham. The mineral products are coal, limestone, black marble, freestone, ironstone, firestone, slate, millstone, grindstone, and lead. Large furnaces for the production of iron are in operation in various parts of the county. D. is one of the chief counties in England for the production and export of coal, and also for the mining of lead. Salt is prepared from brine at several places. Manufactures are numerous, including chemicals, glass, iron, earthenware, sails, ropes, and anchors. Shipbuilding is an important industry. The soil is a clayey or dry loam. The chief crops are oats, barley, wheat, turnips, beans, and pease. The Teeswater breed of short-horned cattle is well-known, and excellent draught and saddle horses are raised. Pop. '91, 1,016,559.

DURHAM COUNTY PALATINE, one of the three counties palatine of England, the other two being Lancaster and Chester. For the privileges of a co. palatine, see **PALATINE**. The co. palatine of D. existed by prescription. It was the only co. palatine in the hands of a subject, and belonged to the bishop of Durham. By 6 and 7 Will. IV. c. 19, the co. palatine of D. is separated from the bishopric, and vested in the crown.

DURHAM, a parliamentary and municipal borough, and ancient episcopal city of England, near the middle of Durham co., built around a steep rocky hill 86 ft. high, nearly encircled by the Wear. On the top of the hill are the cathedral and castle. Ancient walls partly inclose the hill, from which are fine views of the fertile wooded country around, and of the suburbs across the river. The chief manufactures of D. are carpets, paper, and iron, and it has coal and blast furnaces. In the vicinity are coal-mines, and saline, chalybeate, and sulphureous springs. Pop. '91, 14,863. It sends one member to parliament. D. arose about the year 995, when bishop Aldune brought here St. Cuthbert's bones from Ripon, and built a church to enshrine them. On the site of this church, bishop William de Carilepho, about 1093, began the present magnificent cathedral, a Romanesque structure in the form of a Latin cross, to which additions continued to be made till about 1500. It thus exhibits the gradual changes of style between these periods. It was restored during last century, and has lately undergone extensive renovation. It is 507 by 200 ft. with a central tower 214 ft. high, and two west towers 138 ft. high. The cathedral contains many old monuments. Here lie St. Cuthbert's (q. v.) remains. Here also are Bede's tomb and some manuscripts said to be in his handwriting. Cardinal Wolsey was a prelate here. The castle, formerly the residence of the bishops of D., but now the seat of the university of D., was founded about 1072 by William the Conqueror, in the Romanesque style, but it has since been much altered. The dormitory, now the new library of the cathedral, which belonged to the monastery of D., is one of the finest in England. Two of the bridges over the Wear were erected in the 12th century. D. was often attacked by the Scots.

A college was founded here in 1290 by the prior and convent of Durham. It was abolished, however, at the dissolution of monastic houses in the reign of Henry VIII., and its endowments given to the dean and chapter of Durham. Under the commonwealth, Cromwell instituted a college here, and endowed it with the sequestered revenues of the dean and chapter, to whom, however, these revenues again reverted at the restoration, when the college was suppressed. The present university of D. was opened for students in 1833, under the provisions of an act of parliament, obtained by the dean and chapter during the previous year. A royal charter in 1837 empowered the university to bestow degrees. The D. university comprises professorships in divinity and ecclesiastical history, classical literature, mathematics and astronomy, and medicine, with lectureships in Hebrew, classical literature, etc. It has two colleges—University college, and bishop Hatfield's hall. See **UNIVERSITY**.

DURHAM, town and co. seat of Durham co., N. C., noted as a tobacco market and as a winter resort; on the Norfolk and Western, Seaboard Air line, and Southern railroads, 26 miles n.w. from Raleigh. Near this point, April 26, 1865, General Johnston, of the confederate army, surrendered to General Sherman, and the single tobacco factory of the place came into the hands of the federal soldiers, whose favorable report of its products led to an increased demand, to the enlargement of the business, and to the establishment of other houses. There are now many manufactories of tobacco and snuff, including the largest granulated smoking-tobacco factory in the world. Tobacco boxes, fertilizers made from tobacco dust, tobacco bags, cotton goods, and bobbins and shuttles are among other products. There are churches, national bank, Trinity College (Meth. Epis., S.), graded schools, Watts hospital, electric lights, and several daily and weekly newspapers. Pop. '80, 2041; '90, 5485.

DURHAM, JOHN GEORGE LAMBTON, Earl of, an English statesman, was the son of William Henry Lambton, esq., of Lambton Hall, county of Durham, and was born at the family seat, 12th April, 1792. The Lambton estate was not very large, but had been in the possession of the family since the 12th c., the male issue having never once failed during all that period. The antiquity of the family, however, exercised no narrowing influence on his opinions, which were markedly radical. He was educated at

Elton; and when only twenty years of age, married at Gretna Green a Miss Harriet Cholmondeley, who died in the course of a few years. In 1814, he was returned for his native county, and though he did not speak on many questions, he took part in all the more important debates, opposing the corn-law bill of 1815, the additions made to the incomes of the royal dukes, the indemnity bill of 1818, the six repressive bills brought in by government to coerce the people after the great reform meeting at Manchester in 1819, etc. Two years after, he submitted to the house of commons a scheme of parliamentary reform, which of course was not accepted. In 1828, he was raised to the peerage, with the title of Baron Durham of the city of Durham. He was one of the four persons who drew up the reform bill, and supported it in the house of lords. In 1833, lord D. was dispatched on a mission to Russia. On his return to England, his "advanced liberalism" was proclaimed at a dinner given to lord Grey at Edinburgh, in 1834, and in various other parts of the country. After a second mission to Russia, he was appointed governor-general of Canada, where he arrived in May, 1839; but on account of a misunderstanding with the home government, he took the extraordinary step of returning to England in the course of half a year, without either being recalled or obtaining the royal consent. D. died at Cowes, Isle of Wight, 28th July, 1840. He left a son and three daughters.

DURHAM, JOHN S., b. 1861 of colored parents, graduated at the Univ. of Pennsylvania in 1886; became a member of the editorial staff of the Philadelphia *Bulletin*; was appointed by President Harrison, consul to San Domingo in 1890, and minister to Hayti in September, 1891.

DURIAN, or **DURION**, *Durio zibethinus*, a fruit-tree of the Malayan archipelago, of the natural order *sterculiaceae*, of the same tribe or sub-order (*bombaceae*) with the silk-cotton tree. It is a lofty tree, with leaves resembling those of the cherry, and large bunches of pale-yellow flowers. The fruit is of the size of a man's head, roundish oblong, with a hard thick rind, covered with soft spines, so that it somewhat resembles a hedgehog rolled up. The pulp of the fruit is of a sort of creamy substance and delicious taste, but has a smell which is at first very repulsive to Europeans. Persons accustomed to it, however, universally regard the D. as one of the very finest fruits of the east. It brings a higher price than any other fruit in the market in India. It contains 10 or 12 seeds, as large as pigeons' eggs, which, when roasted, are not inferior to chestnuts. One tree yields about 200 durians in a year.

DÜRKHEIM, a t. of Rhenish Bavaria, on the Isenach, 20 m. n. from Landau. It stands at the entrance of the valley of the Isenach, at the base of hills which skirt the plain of the Rhine, and the neighborhood is very beautiful. Many invalids resort to D. on account of its amenity, and to take the *grape-cure*. It has manufactures of tobacco, cutlery, and paper. D. was formerly the residence of the princes of Leiningen-Hardenburg, whose palace was burned by the French in 1794. Not far off are the salt-works of Phillipshall. The summit of a neighboring height is crowned by a rampart of loose stones, 6 to 10 ft. high, 60 to 70 ft. wide at the base, and inclosing a space of about two sq. m., called the Heidenmauer (heathens' wall), which the Romans are said to have built to keep the barbarians in check, and where Attila is said to have passed a winter, after having wrested the fortress from the Romans, when pressing on his way to Rome. Pop. '90, 6081.

DURLACH, an old t. of Germany, in the grand-duchy of Baden, is situated on the river Pfalz, at the base of the Thurmberg, a highly cultivated hill, 3 m. e. of Carlsruhe. D. manufactures linen, tobacco, chicory, vinegar, and machinery, and has extensive fruit and grain markets. The environs abound with orchards. On the summit of the Thurmberg are the ruins of an old castle. D. is a station on the Mannheim and Basel railway. Pop. '90, 8240.

DUROC, GÉRARD CHRISTOPHE MICHEL, 1772-1813; **Duke of Friuli**; a French gen. who served in the wars of the revolution, in the army of Italy, and in the Egyptian campaign. He was a prominent actor in the overthrow of the directory, and was appointed lieut. gen. and governor of the Tuileries. He went on diplomatic service to Sweden, Denmark, Russia, Prussia, and Saxony. In the battle of Austerlitz he was Oudinot's successor; and was near Napoleon in the subsequent campaigns. At the battle of Bautzen, while escorting Napoleon to a position that would overlook the field, Duroc was struck by a cannon-ball, and died soon afterwards. Napoleon afterwards bought the house where he died, and built on the spot a monument to his memory.

DURRA, **DOURA**, **DURRA MILLET**, **INDIAN MILLET**, or **SORGHO GRASS**, *Sorghum*, a genus of grasses, distinguished from *andropogon*—in which many botanists prefer to include it—only by the ovate or oblongo-ovate hermaphrodite spikelets, with glumes that have three small teeth at the extremity. The species are generally annual, tall, broad-leaved grasses, having strong culms filled with a juicy and saccharine pith, and large panicles. Several of them are cultivated as corn-plants chiefly in Asia and Africa, particularly the common D. (*S. vulgare*, or *andropogon sorghum*, *holcus sorghum* of the older botanists), also called *joar* and *javaree* in India. It grows 4 to 8 ft. high, with thickly crowded panicles. It is a coarse, strong grass; its grain is round, a little larger than mustard seed. It is a native of the East Indies, is extensively cultivated in Asia, and may perhaps be described as the principal corn-plant of Africa. It is also cultivated to a considerable

extent in the s. of Europe. It is sometimes cultivated in Germany, but the summer is not sufficiently long and warm to secure its greatest perfection. The climate of Britain is still less suitable. *D.* yields a very abundant produce, in this respect even rivaling maize, but the meal does not make good bread; it is excellent, however, instead of rice for puddings, and is prepared in various ways for food. The culms and leaves, although coarse, are excellent food for horses and cattle, as is also the grain.—The seeds of the SHALOO or SUGAR-GRASS (*S. saccharatum*) are more pleasant to the taste than those of the common durra. It is cultivated in the warm parts of Asia and in Africa, and has a diffuse and very spreading panicle. The sweet pith of the culm is eaten, and is also of value as a source of sugar. This plant has been cultivated to some extent in the Veronese, and its cultivation has been recently introduced into North America—where it is called CHINESE SUGAR-CANE—in order to the production of sugar. It seems likely to form an important new feature in American agriculture, succeeding well at least as far n. as Maine, and yielding sugar in large quantity. In Britain, it succeeds only in the warmest parts. As a forage plant, it is very nutritious when young.—KAFFER CORN (*S. Caffrorum*) has a very diffuse umbel-like panicle, with branches bending down all around. The culm is more than the height of a man, and has a sweet pith. This species is largely cultivated in s. Africa, both by Kaffers and by the colonists. By the latter, the grain is chiefly used for feeding horses.—*S. halepense* is a troublesome weed in the fields of the n. of Italy, like couch-grass. The sweet runners of the roots are kept by the apothecaries of that country as a substitute for sarsaparilla, under the name of *garmignone*, or *smilace dolce*. See SORGHUM.

DÜRRENBURG, a small t. of Prussian Saxony, 5 m. s.e. of Merseburg, deserves mention only for its productive salt springs.

DÜRRENSTEIN, a village of lower Austria, is situated in a highly picturesque locality, on the left bank of the Danube, about 45 m. w.n.w. of Vienna. It is chiefly notable for the ruins of a castle, which stand upon a ridge of bare rock overlooking the town. A peculiar interest attaches to this grand but desolate and shattered fortress, from its having been the prison in which Richard Cœur-de-Lion was confined by Leopold of Austria for 15 months.

DURSLEY, a t. in the w. of Gloucestershire, amid picturesque scenery, at the base of a steep beech-covered hill, and near the Cotswold hills, 15 m. s.s.w. of Gloucester. It is irregularly built, and chiefly consists of three streets, diverging in different directions from the market-place. Pop. about 2500. In the oolitic and lias formation in the vicinity is a quarry of tophies or puffstone, which is a soft and easily worked stone, but hardens on exposure to the air.

DURUY, VICTOR, historical writer, professor, and minister of public instruction in France, was born at Paris in 1811. Members of his family were employed as designers in the lace-works at Gobelins, and he was, in his boyhood, intended to follow their occupation. He began his classical studies at the collège Rollin, then called the collège Sainte-Barbe; but the progress he made was rapid enough to enable him to enter the Ecole Normale in his 19th year. He was, in 1833, teacher of history in the college of Rheims, professor of history at Paris, in the collège Henri Quatre, afterwards called the collège Napoléon, which position he held until 1861. He gained a considerable reputation as a writer on history and geography. Most of his books were school-books, but they were so good that they had a great influence upon the teaching of history in French schools. He got the degree of doctor of letters in 1853. In 1861 he was appointed an academy-inspector of the academy of Paris; next, master of conferences at the Ecole Normale; then inspector-general of secondary instruction; and, finally, professor of history in the Ecole Polytechnique. From the last-named post he was, on the 23d June, 1863, by imperial decree, advanced to the office of minister of public instruction.

D., who, by activity and ability combined, had made himself distinguished while filling a somewhat humble office, was no sooner charged with the control of public instruction, than he began to carry out important changes in the educational system of France—which had undergone scarcely any modification since the introduction of Guizot's education law in 1833. He instituted a tribunal for trying charges brought against professors. He remodeled the examinations for the degree of bachelor of letters. He first suspended, and afterwards abolished, the division of the highest class, which had prevailed in schools of secondary instruction, into two sections: the one rhetorical or literary, the other philosophical (scientific)—thus making the study of science obligatory upon all who passed through the school curriculum. He introduced other changes into the course of secondary instruction, of which the most important—at any rate, that which has been most discussed—was the teaching of contemporary history in the lycées, or departmental public schools. Previously, the text-books used in teaching history in these schools were Bossuet's *Histoire Universelle* and Montesquieu's *Grandeur et Décadence des Romains*—these works being supplemented by the lectures of the professor. *D.* had a text-book prepared for their use, containing a compendium of French history to so late a period as that of the recent French invasion of Mexico; and it has been alleged that this work, and the circulars which the minister published for the instruction of teachers of history, disclosed a systematic attempt to imbue the youth of France with a Bonapartist view of recent history—to make the teaching of the schools a source of future strength to the empire. Perhaps it would be difficult altogether to acquit *D.* of the Machiavellian design imputed to him. As to primary instruction, he

officially proposed to the emperor to make it compulsory and gratuitous; but the proposal was badly received by the public, and the emperor withheld his sanction. He also procured legislative sanction for a measure which greatly increased the number of primary schools, especially of girls' schools, for which the provision made had previously been inadequate. The night-schools for adults, too, were greatly improved and extended under his care; and the educational libraries established in connection with them proved very effective aids to the education of the working-classes. He procured an enactment for establishing schools of special secondary instruction, intended mainly to teach the elements of science to boys of the lower middle class who are to be engaged in manufactures or commerce, and, in the country districts, to give systematic instruction in the methods of agriculture and horticulture.

The matters which have been mentioned are only a few of those which D., with bold and unsparing hand, leaving no part of the system of education untouched, dealt with while in office. It is unquestionable that he in many cases effected improvements; but the spirit and tendency of his administration were strongly impugned, and his conduct was jealously watched by the best portion of French society. It is alleged that he steadily attempted to secure the entire control of education for the state, and to use national schools as a state instrument. For example, the changes which he introduced in the examinations for the degree of bachelor of letters are said to have been intended to force candidates to study at the government establishments; and certainly, if their working has not been misrepresented, their tendency seems to be to place candidates educated elsewhere at a disadvantage. In such charges as this, there may be exaggeration or misconception; but D. is an ardent Bonapartist, and it is natural to suppose that he intended the results which his acts were calculated to produce. He resigned the office of minister of public instruction in 1869. He was decorated with the legion of honor in 1845, and was promoted to be officer, commander, and grand commander of that order. He was an officer of the Turkish order of Medjidie since 1857. He d. in 1894.

Of D.'s numerous works, not a few were written for a series published under the title *L'Histoire Universelle*, of which D. was the editor. His earliest work, *Géographie Politique de la République Romaine et de l'Empire*, first appeared in 1838; it was followed by *Géographie Historique du Moyen Age* in 1839; *Géographie Historique de la France* in 1840; and *Atlas de Géographie Historique Universelle* in 1841. In 1840, he published the first volume of a work of greater pretensions than these—*Histoire des Romains et des Peuples soumis à leur Domination*; a second volume appeared in 1844; a third in 1853, under the title *L'Etat du Monde Romain vers la Fondation de l'Empire*; and the final volume appeared in 1886. *Histoire Sainte d'après la Bible* (1845), *Histoire Romaine* (1848), *Histoire de France* (1852), *Histoire Grecque* (1851), were among his subsequent productions. In 1862, appeared two volumes of his *Histoire de la Grèce Ancienne*, a work which has been crowned by the French academy. *Histoire Moderne* (1863), *Histoire Populaire de la France* (1863), *Histoire Populaire Contemporaine* (1864), *Introduction Générale à l'Histoire de France* (1865), were works prepared under his direction. English editions of his histories of Greece and Rome, edited by Prof. Mahaffy, appeared in 1888.

DURYEA, JOSEPH TUTHILL, D.D., b. Long Island, N. Y., 1832; a graduate of the college of New Jersey, where he was teacher of Greek and rhetoric; in 1859, graduated at Princeton theological seminary; pastor of a Presbyterian church, Troy, N. Y., 1859-1868-79, pastor of Classon avenue Presbyterian church, Brooklyn; 1879-88, pastor of the Central Congregational church, Boston; in 1888-95 pastor of the first Congregational church, Omaha, Neb. He is a broad and deep thinker, and his literary style is careful and finished, though his preaching is mostly without notes.

DUSE, ELEONORA, Italian actress, was born at Vigevano, a village between Piedmont and Lombardy in 1861. Hers was a family of actors, her grandfather having founded a theatre in Padua, and she appeared on the stage when 13 years old. Her early stage-life was a succession of privations and hardships which eventually seriously impaired her health, until she was recognized at Naples as one of the greatest actors, if not the greatest of her time. Her career has since been one of uniform success. She appeared in New York and in London in 1893, and again in 1896, and in Paris in 1897. Her most successful rôles have been Juliet, Francesca da Rimini, Camille, Fernande, Magda, etc. She discarded many of the customary mannerisms of the stage, and gained much of her extraordinary dramatic power from the abandonment of a great deal that is unnatural yet conventional in modern acting.

DUSICYON, a genus of *canidae*, or sub-genus of *canis* (dog), consisting of a number of South American species or varieties, sometimes called aguara dogs. They have the body rather long in proportion to their height, and of considerable bulk, the muzzle rather sharp, eyes somewhat oblique, and aspect somewhat fox-like, the tail also has a more or less perfect fox-like brush. They are more diurnal than nocturnal in their habits, live in burrows, and feed on birds and small quadrupeds. Some of them have been domesticated by the Indians.—Akin to the aguara dogs, but more fox-like, are the aguara foxes (*cerdocyon*, q.v.).

DUSKY BAY, a large inlet on the s.w. coast of Middle isle, in New Zealand, is in lat. 45° 40' s., and long. 166° 20' east. It was entered by Cook in 1769, who here found good anchorage.

DÜSSELDORF, the chief t. of the district of Düsseldorf, in Rhenish Prussia, and the capital of the former duchy of Berg, is situated in the center of a fertile district, on the right bank of the Rhine, at the confluence of the Düssel with that river, in lat. $51^{\circ} 13'$ n., long. $6^{\circ} 45'$ east. It was formerly fortified, but its ramparts were converted into gardens and promenades at the treaty of Luneville, 1802. It is seated in the midst of extensive garden-grounds, and is well built. The streets, the houses of which are built of brick, are regular and spacious; while the rows of trees with which many of them are planted, greatly enhance their appearance. D. is divided into the *Altstadt*, on the right bank of the Düssel; the *Karlstadt*, founded in 1786 by the elector Karl Theodore, on the left bank; the *Neustadt*, on the Rhine; and the recently built *Friedrichstadt*, to the south. A colossal equestrian statue of the elector Johann Wilhelm, who founded a famous picture-gallery here in 1710—the pictures of which, however, were removed to Munich in 1805—stands in one of the five squares of Düsseldorf. The Düsseldorf academy was founded in 1767, reorganized in 1822, and attained great eminence during the years 1822–26, under the management of Cornelius and Schadow. The art-union for the Rhine provinces and Westphalia was founded here in 1828. The principal buildings of D. are the old electoral palace; the present palace, the residence of the governor of the province; the government house, the observatory, town-hall (built in 1567), theater, gymnasium, and public library. Of the ecclesiastical edifices, the most remarkable are the churches of St. Andrew and St. Lambert, and the church of the Jesuits, a handsome and highly ornate structure, having two steeples. The Hofgarten, one of the finest public gardens in Germany, is a very agreeable promenade. D. has manufactures of woollens, cottons, leather, hats, tobacco, jewelry, mirrors, railway carriages, etc., and its trade and industries generally are steadily progressing. A great part of its importance may be said to be derived from its position on the Rhine, as on this account great quantities of goods are sent to D. from the surrounding districts for exportation. Pop. '90, 145,738, most of whom are Catholics. Along with the duchy of Berg, D. came into the possession of Prussia in 1815. It was made a free port in 1829, and since that time it has prospered. It has daily communication with Mayence and Rotterdam by the Rhine steamers. Industry and commerce have likewise received a new impulse since D. became the central point of several lines of railway.

DÜSSELDORF SCHOOL OF PAINTING. This institution, founded in Düsseldorf by Prince Charles Theodore in 1767, did not become famous until, in 1822, it was reorganized by King Frederick William, and put in charge of Cornelius, under whose direction it took at once a high rank. Cornelius was succeeded in 1826 by Schadow, and in 1859 by Bendeman. From 1864, the institution was managed by curators, till in 1873, Wiscelinus of Weimar was chosen director. The school has exerted a wide influence upon art, in America as well as in Europe. Several of the most famous American artists have studied there, and among those who have done much to introduce and popularize its methods and style in this country may be mentioned Eastman Johnson, George H. Hall, Leutze, and Bierstadt. The academy possesses 14,000 original drawings and sketches by the great masters, and 24,000 engravings. The German artists whose names have become most familiar in connection with the school are Cornelius, Lessing, Achenbach, Baur, Tidemann, and Knaus.

DUST, COSMIC OR METEORIC. The constant presence of dust in the air may be demonstrated by the familiar experiment of admitting a beam of sunlight into a dark room. The path of the beam becomes plainly visible owing to the reflection of the light by the myriad particles floating about. Were the air quite pure, nothing of the sort would be seen. To prove that dust exists in the open air also, if we cover a plate with a thin coating of glycerine and expose it to a strong wind, numerous particles of matter will be found deposited on its surface. Examined with the microscope, these prove to be pollen-grains from flowers, bits of vegetable fiber and hairs, mineral and rocky fragments of all kinds, and *iron*. The presence of vegetable and mineral particles is easily explained; but not so the iron. Showers of dust are common near active volcanoes. Mr. Whympers witnessed an eruption of Cotopaxi in which dust and ashes of the supposed weight of 2,000,000 tons were thrown into the air. But dust-showers of other than volcanic origin have frequently been observed in ancient and modern times. Nordenskjöld found particles of metallic iron and nickel in the snow at Stockholm in 1871, on the Polar ice, and in the snows of Finland. Hailstones have been found to have a metallic nucleus of iron pyrites. Glycerined plates exposed to the winds have had iron particles deposited on them. Dr. Reichenbach, of Vienna, has shown that the dust which covers the tops of mountains and other elevated places, contains metallic particles. Magnetic dust was found by Mr. Murray, of the *Challenger*, in the dredgings of the sea-bottom. Arago supposes that the dust-falls are like those of the ordinary *aérolites*. Tacchini and Von Lasaul, on the other hand, believe that the so-called cosmic dust is of terrestrial origin. The main argument for the cosmic or extra-terrestrial origin of such dust is the similarity of its composition to that of meteoric stones, though sometimes the dust differs materially from the constituents of an *aérolite*. Again, the fall of both *aérolites* and showers of non-volcanic dust seems generally to be preceded by the appearance of a fireball or luminous meteor. Many of the best authorities

believe that comets are the source of our meteoric phenomena—shooting-stars, fireballs, aërolites, and, if the theory be true, of meteoric or cosmic dust. Meteors seem to be due to the earth passing through rings of matter which revolve round the sun in cometary or elliptic orbits, the larger masses of this matter reaching the earth as aërolites, and the smaller ones being frittered into dust by the resistance of the air. See AEROLITES: METEORS. A contrary opinion is adopted by Prof. Tacchini of the Collegio Romano in Rome, who has analysed the dust which fell in various parts of Italy and Sicily, 1879. The dust was borne on the sirocco from Africa. The examination revealed the presence of the usual constituents—granules of metallic iron, nickel, cobalt, phosphorus, magnesia, etc. Whirlwinds and cyclones in the Sahara, he believes, raise quantities of the dust into the higher regions of the atmosphere; it there remains suspended until transported across the Mediterranean; then a small descending cyclone—the cause of the barometric depression—brings it to the surface of the earth. But no supporter of the terrestrial origin of the dust has explained the fact that the iron particles found in it are particles of meteoric iron as distinguished from any terrestrial iron known to us. **The cosmic origin seems most probable.**

DUST SHOWERS AND BLOOD RAIN, occurring as they do only at long intervals and extending over an immense area of the earth's surface, have heretofore been regarded with consternation and superstitious awe. It is only since Christian Gottfried Ehrenberg, the great scientist, in 1814, turned his attention to the subject and announced his wonderful discoveries to the world, that these showers, occasionally transported by the winds, are known to be infusorial in their character. There are on record accounts of 340 dust and blood showers in all, and of these 81 occurred B.C. and 249 since the Christian era. The first of which we have any knowledge is recorded in Mosaic history, and was inflicted upon the Egyptians. It was called the Plague of Blood, and all the land was covered for three days and three nights. Ehrenberg remarks that these phenomena seem to prevail most frequently within a zone extending from that part of the Atlantic off the west coast of Africa, along in the direction of the Mediterranean sea, reaching a short distance north and continuing east to Asia between the Caspian sea and Persian gulf. This zone has a breadth of about 1800 miles. What is called the Cape de Verd shower in 1834 covered an area of 960,000 to 1,648,000 square miles. A single dust shower, covering about 100,000 square miles of surface, like that in Italy and Sicily in 1803, or the one in Lyons in 1846, would deposit 112,800 weight of dust in a single day, while from the fall of meteorites, between the years 1790 and 1819, it is estimated that only about 600 weight was deposited. The height of this dust-cloud region is supposed to be about 14,000 feet. A simultaneous occurrence of dust showers and meteoric stones has been observed in probably eighteen instances before the Christian era, and fourteen since, making thirty-two in all. By examination, the relative prevalence of different forms and the colors represented lead to the conclusion that these showers are of atmospheric origin and related to the fall of meteorites. The reddish color of the dust, as well as the organic forms, prove conclusively that these showers are not of African origin, particularly as the storm winds and sirocco are found to contain the same species of organism, the whole number of which, as yet known, is 320. There seems to be no longer any doubt that living organisms may develop themselves in the atmosphere, under certain conditions, and not from any ova introduced, but entirely from self-development. During the first great plague of Rome, in the reign of Romulus, Plutarch (q. v.) tells us that it seemed to *rain blood*, an omen which, in ages of barbarism, has been several times recorded. It has been observed in modern times, as well as during the sweating sickness at Cremona in 1529, that the red fungus which causes this appearance has been found to be co-existent with epidermis. The blood spots, as they were called, went for that reason by the name of *signacula*. They were observed in the plagues of the sixth century, and during those of 789 and 959 were called *lepra vestium*. In the plagues of 1500 and 1503 these phenomena caused great alarm, more especially as the sign of the cross would be observed in them. George Agricola was one of the first to look upon these spots in a scientific manner, when in the sixteenth century he pronounced them to be produced by a lichen. Accompanying the occurrence at this time was a remarkable failure of the crops, which is often the result of an abundance of fungæ. See INFUSORIA.

DUST'EE, the largest river of Beloochistan, enters the Arabian sea, in lat. 25° 3' n., and long. 61° 45' east. In proportion to length, it is certainly the least considerable stream in existence. It is about 1000 m. long; and yet it has been found to be, at its mouth, 20 in. deep, and 20 yards wide.

DUSTY-FOOT was a court of summary jurisdiction established at fairs in England for the speedy determination of questions arising between those who resorted to the fair.

DUTCHESS, a co. in s.e. New York, on the e. side of the Hudson river, crossed by the New York Central and Hudson River, the Philadelphia, Reading, and New England, the Poughkeepsie and Eastern, and the West Shore railroads; 853 sq. m.; pop. '90, 77,879. It has a rolling and in some places hilly surface, and the soil is for the most part very fertile. Co. seat, Poughkeepsie.

DUTCH LANGUAGE AND LITERATURE. See NETHERLANDS. Dutch is the written dialect of the inhabitants of the Netherlands. It belongs to the Aryan family of languages and to the Teutonic division thereof. The alphabet consists of the same letters as the English, the vowels having essentially the same sound as in French. In the inflection of the nouns and in the general construction of words and sentences the language strongly resembles the German. The plural of the noun is usually formed by adding *en* or *n* to the singular. The language is characterized by great simplicity, directness, and force, the greater breadth of its inflections giving it some advantage over the English. It has great facilities for the formation of compound words, often a great convenience. In this respect it is superior even to the German. In many instances where the English are compelled in the formation of a technical word to borrow from the Latin or Greek, the Dutch resort to their own indigenous roots. Many nautical terms and phrases in common use among the English are derived from the Dutch. Some specimens of the Dutch language date as far back as the 9th century. They resemble low German, and show that the language had its origin in the same source as all the other Teutonic dialects. It is almost identical with the Flemish, the differences being mainly in orthography and pronunciation. Dutch literature, as distinguished from the Flemish, dates no further back than 1570. It has had, however, a very striking development. Among the distinguished scholars of the nation in the past may be mentioned Erasmus, Grotius, Arminius, Spinoza, and Boërhaave. In the earlier portion of the 17th c., the free commonwealth of Holland was distinguished above every other European nation for its devotion to literature, and it can hardly be said to have fallen much in the rear since that day. The nation has had and still has its eminent poets, historians, travelers, philosophers, scientists, and theologians, whose works have attained a high rank.

DUTCH LIQUID, Ethylene dichloride, is an oily substance obtained by mixing chlorine and olefant gases, which combine together and yield D. L., with the formula $C_2H_4Cl_2$. It has a specific gravity of 1280 (water = 1000), boils at $182.3^\circ F.$ ($83.5^\circ C.$), is not miscible with water, but readily dissolves in ether and alcohol. It possesses the power of producing anæsthesia (q.v.), just as chloroform (q.v.) does; but the great difficulty of preparing D. L. in commercial quantities must retard its employment as an anæsthetic.

DUTCH REFORMED CHURCH. See REFORMED CHURCH IN AMERICA.

DUTCH RUSHES. See *EQUISETUM*.

DUTCH SCHOOL OF PAINTING. This school holds a high and honorable place in the history of art, being marked by many excellences and illustrated by many eminent names. The school took its rise in a divergence from the schools of Germany at the beginning of the 15th century. Its founders were Hubert and Jan van Eyck, who united the majestic simplicity of the ancient Christian type with a close imitation of external nature and a homely strength characteristic of their country. Hubert van Eyck improved the method of painting in oil to such an extent that he is almost entitled to the honor of being its inventor. The altar-piece in St. Bavo, at Ghent, is the work of the brothers van Eyck. In its complete form it consisted of a centre picture of the Worship of the Lamb, surmounted by pictures of God the Father, the Virgin, and St. John, and flanked by folding shutters relating to the principal subject. The parts of this picture—one of the most remarkable productions of modern art—are now separated, the upper and middle portions remaining at Ghent, the others being at Berlin. Two of Hubert van Eyck's most important works are his "Triumph of the Church" in the museum at Madrid, and "St. Jerome" in the gallery at Naples. An admirable specimen of Jan van Eyck's work is a picture of a man and woman in the British national gallery. The influence of these brothers was very extensive. Their pupils were numerous, and of them all, Rogier van der Weyden, who died in 1464, was the most eminent. "The Last Judgment," in the hospital of Beaume, and the "Adoration of the Kings," at Munich, are his. Memling, one of his pupils, was remarkable for the refinement of feeling and the beauty of form displayed in his pictures. Some beautiful specimens of his work are in St. John's hospital, Bruges. "The Last Judgment" in the church of Our Lady, at Dantzic, is probably the best production of his pencil. His influence extended till nearly the end of the 16th century. Quentin Matsys was one of the earliest painters of those homely subjects of which so many examples are found in the Dutch school. His masterpiece, a "Deposition from the Cross," is in the Antwerp museum. Among the portrait painters of the Dutch school in the 16th c., several attained eminence in England. At the beginning of the 17th c. appeared the celebrated Rubens, the herald of a great revival of painting. His forms are gross, but full of life and power. His works are numerous, and specimens are to be found in almost every continental gallery. They may be studied to best advantage at Antwerp, Vienna, and Munich. His "Descent from the Cross," and its companion in the cathedral of Antwerp, are among his best productions. Vandyck, the celebrated portrait painter, was a pupil of Rubens. Some of his best work was done in England. The greatest of the Dutch painters, however, was Rembrandt, whose mastery of light and shade was wonderful, and whose works are now among the most precious treasures of art. His engravings are of equal merit with his paintings. The masters in *genre*, by which is meant the every-day life in art as contrasted with the grandeur of historical

or devotional works, have been numerous in the Netherlands. In this department, Teniers, the elder and the younger, are eminent. Gerard Dow, a pupil of Rembrandt, was also celebrated in this line. Among the most noted marine painters of the Dutch school were Bonaventura Peters and Ludolph Backhuysen. In the 18th c., there was in Flanders and Holland, as well as elsewhere, a decline in the artistic spirit, which was followed in the 19th by a revival.

DUTENS, LOUIS, a French writer, was b. at Tours, 16th Jan., 1730. Being a Protestant, he sought to make his way in England, and occupied himself at first in teaching and in self-improvement. At last, he accompanied the English ambassador to the court of Turin as his secretary, and afterwards remained as *chargé-d'affaires*, a position which he occupied twice subsequently. He held a pension, and was presented to the rich living of Elsdon, in Northumberland; and was likewise made historiographer-royal of Great Britain. He died in 1812. His numerous works display great versatility and knowledge of the world. He undertook the first comprehensive, though not complete, edition of Leibnitz's works (6 vols., Geneva, 1769). In his *Recherches sur l'Origine des Découvertes attribuées aux Modernes* (2 vols., 1766), he rates the knowledge and invention of the ancients by far too high. The *Tocsin* (Rome, 1769), which afterwards appeared under the title of *Appel au Bon Sens* (Lond. 1777), contains some sharp attacks on Voltaire and Rousseau. There is considerable historical interest in his *Histoire de ce qui s'est passé pour le Rétablissement d'une Régence en Angleterre* (Lond. 1789). He also wrote several able treatises on numismatics and other subjects. In the *Considérations Théologiques sur les Moyens de réunir toutes les Eglises Chrétiennes* (Par. 1798), he proposed that a council should compose a confession of faith grounded on the decrees of the councils of the first six centuries. His *Mémoires d'un Voyageur qui se repose* (Par. 1806) met with general favor.

DUTIES. See CUSTOMS.

DUTROCHET, RENÉ JOACHIM HENRI, an eminent French physiologist and physician, was b. at the Château de Néon (Poitou), 14th Nov., 1776, and went to Paris in 1802, to study medicine. His career as a student was brilliant, and in 1808 he was appointed military physician to Joseph Bonaparte, king of Spain. Soon after, he became physician-in-chief of the hospital of Burgos, then devastated by typhus fever. Returning to France in 1809, he gave himself up exclusively to the study of nature, and published a series of works on physics and physiology, full of new ideas. In 1819, he became a correspondent of the royal academy of science; in 1823, of the royal academy of medicine; and in 1831, a member of the former. He died 4th Feb., 1847. The substance of all D.'s investigations and discoveries is contained in his *Mémoires pour servir à l'Histoire Anatomique et Physiologique des Végétaux et des Animaux* (Paris, 1837). He is best known by his researches on the passages of fluids through animal and vegetable substances. The passage of a fluid from without, inwards, he calls *endosmosis*; and from within, outwards, *exosmosis*. These terms have since been widely adopted by physiologists. See DIFFUSION.

DUTTEEAH, or DATIYAH, a principality or raj, having a capital of the same name, is a protected but not tributary state, extending in n. lat. from 25° 32' to 26° 18', and in e. long. from 78° 15' to 78° 54'. The city of D. is situated on a rocky height, and in 1891 had a population of 27,600.

DUTTON, HENRY, LL.D. 1796-1869; b. Conn.; a graduate of Yale, and professor of law in that college. In 1854 he was elected governor of Connecticut; in 1861 he was judge of the superior court of errors. He compiled the statutes of the state, and prepared several digests.

DUTY. See ETHICS.

DUUMVIRS, officers among the Romans appointed for special services, such as magistrates of colonies and towns, constructors and commanders of fleets, and municipal censors. In the eastern empire the people elected for one year *duumviri ludorum*, who were to provide exhibitions of games at their own expense.

DUVAL, CLAUDE, a notorious highwayman, who was born in Domfront, Normandy, France, in 1643, and went to England, as a follower of the Duke of Richmond, at the time of the restoration of Charles II., 1660 (q.v.). He ingratiated himself with the ladies, while he robbed gentlemen of their purses, until he was checked in his career by being captured while he was intoxicated, and was finally hanged at Tyburn, Jan. 21, 1670. His body was buried in the middle aisle of Covent Garden church.

DUVAL, a co. in n.e. Florida, on the Atlantic, intersected by St. John's river, and reached by the Jacksonville, Tampa, and Key West, the Florida Central and Peninsular, and other railroads; about 900 sq. m.; pop. '90, 26,800. The surface is level; chief productions, corn, sugar, and sweet potatoes. Co. seat, Jacksonville.

DUVAL, a co. in s.w. Texas, on the Rio Nueces; 1759 sq. m.; pop. '90, 7598. Stock-raising is the chief business. The Texas and Mexican National railroad intersects it. Co. seat, San Diego.

DUVERGIER DE HAURANNE, JEAN, 1581-1643; a French theologian, native of Bayonne; studied at Louvain, and was fellow-student with Jansen. About 1611, Duver-

gier was made canon at Bayonne. In 1620, he was made abbot of St. Cyran. In Paris he formed a connection with the influential Arnauld family, and, with Angelique Arnauld, directress of the convent of Port Royal, he completely reformed that institution. By taking a leading part in the Jansenist controversy, he excited the enmity of the Jesuits, and at last he was suspected by Richelieu, and thrown into prison in March, 1638. No evidence was found against him, but to break his strong influence he was kept confined until the death of Richelieu. He was then set free, and at once recommenced his war upon the Jesuits; but about six months afterwards died of apoplexy.

DUVERNOY, GEORGES LOUIS, 1777-1855; a French naturalist, invited in 1802 by Cuvier to assist in making the latter's treatise on comparative anatomy. Duvernoy prepared the last three volumes of the work. He practiced medicine for 20 years. In 1827, he was chosen professor of natural history at Strasburg, where he published several papers on anatomical themes. In 1837, he was professor of natural history in the college of France, and in 1850 occupied the chair of comparative anatomy.

DUVEYRIER, HENRI, b. Paris, 1840. He was educated in Germany, and became acquainted with Dr. Barth, the African explorer. He made a trip to Africa in 1857-59, and published *Explorations of the Sahara*. In 1871, he served in the French army, and was for a time a prisoner of war. He d. in 1892.

DUXBURY, a t. in Plymouth co., Mass., on Plymouth harbor, and the New York, New Haven, and Hartford railroad; 30 m. s.e. of Boston. It is the landing-place of the Atlantic cable from Brest, France. Fishing and farming are the leading industries. The town contains the grave of Miles Standish, the Standish monument, and Partridge academy. Pop. '90, 1903.

DUYCKINCK, EVERT AUGUSTUS, 1816-78; b. N. Y.; graduated at Columbia College, 1835; in 1840, editor of *Arcturus*, a monthly magazine; in 1847, he and his brother George started the *Literary World*, and continued it till 1853. In 1856, the brothers finished the *Cyclopedia of American Literature*, an elaborate work in two large volumes, to which, in 1865, Evert added a supplement. Among his publications are *Wit and Wisdom of Sydney Smith*; *Poems relating to the American Revolution*; *History of the War for the Union*; *National Portrait Gallery of Eminent Americans*; *History of the World from the Earliest Period to the Present Time*; and *Memoirs of Francis L. Hawks*.

DUYCKINCK, GEORGE LONG, 1823-63; b. N. Y.; brother of Evert A.; graduate of the University of New York, 1843. Besides his work with his brother, he was the author of *George Herbert of Bemerton*, and of lives of bishop Thomas Ken, Jeremy Taylor, and Latimer.

DUYSE, PRÆDENS VAN, a Belgian writer, was b. in Dendermonde, in Belgium, Sept. 28, 1804. After completing his academical career, he was appointed archivist of his native town, from which he was removed to the same office in Ghent. He soon afterwards received the office of professor of national history in the atheneum, and was made a member of various learned societies both in Belgium and France. He died Nov. 13, 1859. D. was one of the chief contributors to the revival of Flemish literature. As a poet, he was less remarkable for genius than for prodigious fertility; his pieces all bear the stamp of improvisation, of which he was a great master. Several of his productions, both poetical and prose, obtained prizes from literary societies. Of 47 poetical publications issued by D. between 1836 and 1859, we may mention *Vaderlandsche Poëzy*; *Natalia*; *Elegiën*; *Gedichtjes voor Kinderen*; *Het Klaverblad*; and *Nieuwe Kinder-gedichtjes*.

DVOŘÁK, ANTONIN, was b. Sept. 8, 1841, at Muhlhausen in Bohemia. His father was a butcher and desired him to follow the same trade. He studied the violin and the organ, and published in 1873 *The Heirs of the White Mountain*, and subsequently received an annuity from the government. He achieved a reputation in England by his *Stabat Mater*, performed in London in 1883. He came to America 1892 and undertook the directorship of the National Conservatory of Music in New York City, where in 1893 he produced his *New World Symphony* conceived as an expression of the American spirit.

DWALE. See **BELLADONNA**.

DWARF. See **GIANTS AND DWARFS**.

DWARFED TREES, growing in flower-pots, are a characteristic ornament of Chinese and Japanese houses and gardens, and the production of them is an art which has been carried to great perfection. It depends on the prevention of an abundant flow of sap, so that whilst the tree is kept living and healthful, vegetation does not go on with its natural activity. The trees are planted in shallow and narrow flower-pots; care is taken that their roots never pass into the ground beneath; they are very sparingly supplied with water, and their strongest and leading shoots are pinched off.

DWARKA, a small town in India, on the Arabian sea, famous as a resort for Hindoo pilgrims. It is near the western end of the Kathiwar peninsula, and in the territory of the Gaekwar of Baroda.

DWIGHT, EDMUND, 1780-1849; b. Mass. graduated at Yale, and studied law. He was the founder of a firm in Boston which, by establishing great cotton mills, did much toward building up the manufacturing villages of Holyoke and Chicopee. He was

also a leading promoter of normal schools in the state, to the establishment of which he gave a large sum of money.

DWIGHT, HARRISON GRAY OTIS, D.D., 1803-62; b. Mass.; graduated at Hamilton college in 1825; and at once went out under the direction of the American board to assist in the Armenian mission in Turkey, taking a position in Constantinople, where he soon became noted as one of the most zealous and successful workers in the Armenian field. While on a visit to the United States he was killed in an accident on the Troy and Bennington railroad. Among his works are *Researches of Smith and Dwight in Armenia: Memoirs of Mrs. Elizabeth B. Dwight; Christianity Revived in the East; and a Catalogue of Literature in Armenia*.

DWIGHT, JOHN SULLIVAN, b. Boston, 1813; graduated at Harvard, and became a Unitarian minister, in which office he continued about six years. He was one of the Brook Farm experimenters, holding on to the last. Having an excellent musical education, he was engaged by the New York *Tribune* to write a series of criticisms of Jenny Lind's performances, which were the first musical criticisms of any consequence that ever appeared in an American daily journal. Soon after the departure of the songstress he established (in 1852) in Boston *Dwight's Journal of Music*, of which he was editor till 1881. He d. in 1893.

DWIGHT, NATHANIEL, 1770-1831; a brother of Timothy of Yale. He issued the first geography for common schools published in the United States. Among other works by him are *A Compendious History of the Signers of the Declaration of Independence*, and *The Great Question Answered*.

DWIGHT, SERENO EDWARDS, D.D., 1786-1850; a graduate of Yale; at first a lawyer. In 1817, after studying divinity, he became pastor of Park street church, Boston. From 1833 to 1836, he was president of Hamilton college. Among his works are *Life of Jonathan Edwards* (his great-grandfather, whose works he edited), and *The Hebrew Wife*.

DWIGHT, THEODORE, 1764-1846; b. Northampton, Mass.; a lawyer and journalist. His mother was a daughter of Jonathan Edwards. In politics, he was an extreme federalist, and officiated as secretary in the Hartford convention. He was a brilliant writer and speaker, and was in congress, 1806-7. He edited the *Mirror*, Hartford, Conn.; then the *Albany Daily Advertiser*; and started the New York *Daily Advertiser* in 1817, and was its principal editor for eighteen years. Among his works were *Life and Character of Thomas Jefferson*, and *History of the Hartford Convention*.

DWIGHT, THEODORE, 1796-1866; son of the secretary of the Hartford convention; graduated at Yale, 1814; and turned his attention to authorship. Among his works are *Tour in Italy*; *Life of Garibaldi*; *Northern Traveler*; *Tour in New England*; *Father's Book*; *First Lessons in Modern Greek*; *The Roman Republic of 1849*; and *The Kansas War*.

DWIGHT, THEODORE WILLIAM, LL.D., b. N. Y., 1822; graduated at Hamilton college; afterwards studied law, and was professor of that science in Hamilton college, where he started a school of law. From 1858-91 he was professor of law in Columbia college, New York. He has published several works on legal themes, among which are *Trial by Impeachment*; *Argument in the Rose Will and Charity Cases*; besides papers in the *American Law Register*, of which he was assistant editor. In 1868, he became non-resident professor of constitutional law in Cornell university, and, in 1869, lecturer in Amherst college. He acted as member of the N. Y. state constitutional convention in 1867; president of the N. Y. prison association, etc. He died June 29, 1892.

DWIGHT, TIMOTHY, D.D., LL.D., an American theologian, was b. at Northampton, in Massachusetts, May 14, 1752; studied at Yale college, New Haven; and was licensed to preach in 1777. During the war of independence, he was for some time a chaplain in the American army. In 1783, he was ordained minister of Greenfield, in Connecticut, where he also conducted an academy for 12 years with distinguished success. In 1787, the college of Princeton, N. J., conferred on him the degree of D.D.; and in 1795, he was elected president of Yale college and professor of divinity. He died Jan. 11, 1817. D.'s principal work is his *Theology Explained and Defended in a Series of 173 Sermons* (5 vols., Middletown, Conn., 1818, etc.). It has been frequently reprinted in England; and used to be—as probably it still is in quiet country quarters—very popular among elderly persons of a serious turn of mind. D. was not a great or original thinker; but his mind was fertile in the production of respectable ideas, which, though sufficiently commonplace, were yet pleasing both in themselves, and from the important nature of the subjects to which they referred. Among his other writings may be mentioned, *The Conquest of Canaan, an Epic Poem* (1785); *Travels in New England and New York* (1821), reckoned by Southey the most important of his writings; and two volumes of *Sermons* (Edin. 1828).

DWIGHT, TIMOTHY, D.D., b. Norwich, Conn., 1828; grandson of president Timothy D.; was graduated at Yale college, 1849; tutor, 1851-55; became professor of sacred theology in Yale theological school, 1858; member of the American committee for the revision of the Bible, 1873-74; elected president of Yale univ., 1886.

DWIGHT, WILLIAM THEODORE, D.D., 1795-1865; b. Conn.; graduated at Yale, 1813; admitted to the Philadelphia bar, 1821. About 1830 he turned his attention to

theology, studied for the Congregational ministry, and (two years afterwards) became pastor of the Third church, Portland, Me. He published a memoir of his brother, Sereno Edwards Dwight, and a number of reviews and addresses. He was a man of commanding influence as a thinker, writer, and preacher.

DWINA, NORTHERN—as distinguished from the Western Dwina or Düna (q.v.)—an important river of Russia, has its origin in the confluence of the Suchona and the Jug, two streams, the latter more than 200 m., and the former nearly 300 m. in length, rising in the s. of the province of Vologda, and uniting in lat. 60° 45' n., long. 46° 30' east. The D., from the union of these streams, flows n. for about 50 m., and receives the Vytchegda from the e., a river 500 m. long. At this point, the D. becomes navigable, and here it alters its direction, and proceeds n.w. toward the gulf of Archangel, into which it flows, having been joined on the right by the Pinega, and on the left by the Waga, and having traversed a course of about 700 miles. The basin of the D. comprehends an area of 123,900 sq. miles. Its average width is from 500 to 600 ft.

DYADIC ARITHMETIC. Arithmetic in which only two significant figures are used. The same as *binary arithmetic*. (q.v. under **ARITHMETIC**).

DYAKS. See BORNEO.

DYCE, ALEXANDER, an English literary historian, was b. at Edinburgh, 30th June, 1798. He was educated at the high school of that city, and afterwards at Oxford. After officiating for some time as curate, he settled in London in 1827. His literary reputation is chiefly based on his editions of the older English poets and authors—George Peele, Robert Greene, John Webster, Shirley, Thomas Middleton, John Skelton (an author of the beginning of the 16th c., previously little known), Beaumont and Fletcher, Ford, and Marlow, with biographies of the authors, and instructive notices. He also edited the poems of Shakespeare, Pope, Akenside, and Beattie, for Pickering's *Aldine Edition of the Poets*. An old play discovered by him, called *Timon*, and which may possibly have first suggested to the great poet the idea of his drama of the same name, was besides published for the Shakespeare society, as well as another entitled *Sir Thomas More*. In conjunction with Collier, Halliwell, and Wright, he founded the Percy society for the publication of old English ballads, plays, and poems. His ability as a commentator on Shakespeare is proved by his *Complete Edition of the Works of Shakespeare; the Text Revised; with Account of the Life, Plays, and Editions of Shakespeare, Notes, etc.* (1858). He died in 1869.

DYCE, WILLIAM, R.A., a distinguished painter, was b. at Aberdeen in 1806. He was educated at the university there, and at the age of 16 took the degree of master of arts. After acquiring the rudiments of his art-education he went to Rome, where he studied for some years. His tendency at first was very strongly, and continued so under certain modifications, towards early Italian, or pre-Raphaelite art, and his productions attracted the marked attention of Overbeck, the head of the modern German school. On his return to Gt. Britain, he settled in Edinburgh, where, besides painting portraits, he contributed largely to the exhibitions. The first picture he exhibited in Edinburgh was in the Perugino style, and though evincing great power, was at that period, 1829, but little felt or appreciated; his "Puck," however, exhibited at the same time, was very successful, and most of his after-contributions to the exhibitions of the royal Scottish academy, of which he was a member, were deservedly popular, particularly his picture of "Francesca da Rimini," exhibited in 1837. After this he went to London, having been nominated to the head-mastership of the new school of design at Somerset house, an office which he obtained on account of his general acquirements and knowledge of art, and which he held for three years. Soon after this he was appointed professor of painting in the London university. He distinguished himself at the Westminster competition by his frescos, and in consequence was one of the artists selected to decorate the palace of Westminster and the house of lords, and at Osborne house several works in fresco have been executed by him. D. was elected an associate of the royal academy in 1844, and academician in 1848. The following are some of the works he exhibited in the royal academy: "King Joash Shooting the Arrow of Deliverance;" a "Madonna and Child" (1846); a "Meeting of Jacob and Rachel" (1850); "Christabel" (1855); "The Good Shepherd" (1856); "Titian Preparing to make his Essay in Coloring;" "Neptune Assigning to Britannia the Empire of the Sea;" a study for a fresco at Osborne (1857); "St. John Leading Home his Adopted Mother;" "The Man of Sorrows" (1860); and "George Herbert at Bemerton" (1861). He died in 1864.

DYCK, SIR ANTHONY VAN. The history of this celebrated painter is of great interest, not only from the high position he held as an artist, but from his having settled in England, where he executed numerous works, which enable us to realize most of the personages whose actions form prominent points in the history of this country. He was b. at Antwerp, 22d Mar., 1599. His father, according to Houbraken, was a glass-painter; and it is said that his talent was fostered by his mother, who painted landscapes, and was skillful in embroidery. After making very considerable progress under Van Balen, he was, in 1615, admitted as a pupil of Rubens, who was not slow to

appreciate his great talents. In a letter, dated 17th July, 1620, addressed to the earl of Arundel, known historically for his patronage of art, the writer states, "Van Dyck lives with Rubens, and his works are beginning to be esteemed little less than those of his master. He is a young man of one-and-twenty, whose parents are persons of considerable property, and it will be difficult, therefore, to induce him to remove." Soon after this—namely, in 1621—by advice of Rubens, he visited Italy. The works of the great Venetians were the first to attract his attention. After leaving Venice, Genoa was the next city he resided in, then Rome, and he went a second time to Genoa, from whence he made a short visit to Palermo. Van Dyck was five years in Italy, and from the number of portraits painted by him in Genoa—many of the best of his works in his Italian manner are still there—he must have lived a considerable portion of the time in that city. On his return to Antwerp, in 1626, he executed various pictures for churches, and the portraits classed among those painted in his Flemish style; the series of cabinet portraits of the painters of his day, engraved by Vostermans, etc., and most of which are now in the possession of the duke of Buccleuch, were also painted at this time. It is stated that, about 1630–31, Van Dyck visited England, and, meeting with no encouragement, remained only a short time; however, there is no satisfactory proof of this. But in 1632, he went to England, by invitation of the earl of Arundel, at the command of Charles I. He was lodged at Blackfriars, was soon afterwards knighted, and had a pension of £200 a year settled on him. His commissions were now numerous, he was enabled to live in great style, entertained people of high rank, and had a country-house at Eltham, in Kent. His wife, Marie Ruthven, by whom he had one daughter, was the daughter of Patrick Ruthven, physician, fifth son of lord Gowrie. Van Dyck died in London in 1641, leaving property to the amount, it is said, of about £20,000. Only 20 years are included within the time when Van Dyck left the studio of Rubens till the period of his death; and during that short career, the number of pictures executed by him, on what is thought to be good authority, seems almost incredible, for in Smith's Catalogue Raisonné of the Works of the Dutch and Flemish Painters, there are descriptions and interesting particulars of upwards of 950. This artist's works may be classed as executed in three distinctly marked styles: 1. Those painted in Italy during his residence of five years, from 1621 till 1626; these are distinguished by deep tone and color, and dignity of character and expression. The portraits of the "Lomellini Family" and an "Italian Nobleman," in the Scottish national gallery, are good examples of his style at this period. 2. His productions between 1626 and 1631, when he lived in Flanders, are known as done in his Flemish style; these works are executed with much *impasto* or body of color in the lights, and transparency in the shadows. Perhaps it was during this period of his career that he executed his finest works, among which the best are the portrait of Snyder the painter, now the property of the earl of Carlisle; the companion-picture of Snyder's wife, now belonging to the earl of Warwick; and the portraits of Philip le Roy and of his wife Mme. le Roy, purchased by the marquis of Hertford at the sale of the king of Holland's pictures. 3. The portraits he painted in England between 1631 and 1641; these are noted for grace and elegance, but many of them were often slight in execution, or done partly by assistants. Van Dyck's biographers and critics generally dwell at great length on his Scripture subjects, and express regret that he devoted so much of his time to portrait-painting; but different notions seem to be now gaining ground. No Scripture subjects by Rubens or Van Dyck, or produced in any of the later schools, will stand comparison, for purity of feeling and appropriate technical execution, with the works of the earlier masters; and the allegorical pieces so much in vogue in the 17th c., are little in accordance with the ideas of the present time. But the portraits by Van Dyck are all interesting and valuable histories, recorded with marvelous truth and vividness, of characters who played important parts in an era noted for great events—and as works of art will rank with the productions of the best schools. See illus., *CORREGGIO, ETC.*, vol. IV.

Van Dyck's etchings are admirable. Several of the portraits in the collection of portraits of artists, are etched by him. The impressions of those that were thrown off, when the heads merely were etched, are of great value; indeed, in expression and spirit, they are unequalled. See Carpenter's *Memoir* (1844).

DYEING is the art of staining or coloring textile fibers. It has been practiced among eastern nations from time immemorial; and in the sacred writings, we read of the vestments of the high-priest being dyed purple, of linen cloths being dyed blue, purple, and scarlet, and of rams' skins being dyed red. The famous Tyrian purple is believed to have been discovered by an inhabitant of Tyre fifteen hundred years B.C.; and immediately afterwards the Tyrian purple became the badge of royalty, and cloth dyed with it commanded a princely price. The Egyptians, Greeks, and Romans practiced the art of dyeing; and gradually it became more and more wide-spread as civilization advanced, the discovery of America and other lands materially increasing the number of dye-stuffs. Dyeing differs from painting in that the colors are fixed within the substance of fiber and not merely attached to the surface. The staining of wood is comparable to the dyeing. The production of a colored pattern upon woven fabric constitutes a separate branch of dyeing, and is described under calico-printing.

The coloring-matters used in dyeing are obtained from the animal and vegetable

kingdoms, or are made artificially. See DYE-STUFFS. With respect to their behavior toward the material to be dyed, dyestuffs may be divided into 2 classes. (1) A natural affinity appears to exist between the fiber and the coloring-matter, such that by simple immersion, the material at once absorbs the coloring-matter from its solution. The fiber is then said to be *substantively* dyed, and the color is called a *substantive* color for that particular fiber. Most of the coal-tar colors are substantive toward silk and wool and a few toward cotton. (2) The coloring-matter has no attraction directly for the fiber, but it readily combines with another substance, called a *mordant*, with which the fiber has been previously charged. Such colors are called *adjective* colors. Generally speaking, a substantive dyestuff has a particular color of its own, and, unmixed with another dyestuff, can produce upon the fiber only that one color in light or dark shades. As a rule, the color of the dyed fabric is the same as that of the solution of the dyestuff. On the other hand, an adjective dyestuff, if it has an original tint of its own, is not an essential feature, since the colors produced on the material depend chiefly upon the particular mordant used. For instance: Madder dyes material mordanted with alumina salts pinks and reds, with iron salts violets and blacks; and logwood with alumina salts gives violets, and with iron or chromium salts blacks. Thus it is seen that if the madder and logwood, or the principles contained in them, have colors of their own, this has little to do with the colors they form with various metallic salts. Mordants, therefore, not only fix the dye, rendering it fast and permanent, but they also determine the shade produced, as well as the brightness of it.

Mordants may be defined as substances which are easily fixed within the fibers and which readily combine with the coloring-matters to form insoluble compounds. The following examples will suffice to show the mode of applying some of the more important metallic mordants. Iron, alumina, and chromium salts may be fixed in textile fibers in several ways. By boiling the material in a solution of alumina, iron, or chromium acetate, acetic acid is evolved and an insoluble basic salt of alumina, iron or chromium is precipitated in the fiber. The same result may be attained by impregnating the fiber with one of these acetates and then steaming. This is done in calico-printing. Saturating the fiber with a soluble salt of iron, alumina, or chromium and then immersing it in an alkaline bath, fixes the hydrates of iron, alumina, or chromium, as the case may be. Oxide of tin is fixed by boiling the fiber in chloride of tin. Immersion in a solution of stannate of soda followed by one in tannin fixes tannate of tin. Silk and wool are mordanted with alum by simple immersion in the aqueous solution of it, when they absorb a considerable quantity. Alumina acetate is called by the dyer *red liquor*, iron acetate *black liquor*, and chloride of tin *red spirits*, on account of the colors they produce with certain natural dyes. The mordants so far described are basic, and naturally they have the greatest affinity for dyes with acid properties, such as madder (alizarine), logwood, fustic, Brazil-wood, and cochineal. Tannic acid is readily absorbed by the different fibers, and it serves to fix, on cotton particularly, dyes which are basic, such as rosaniline, malachite green, and other coal-tar dyes. It forms with such colors insoluble tannates in the fiber. Another class of mordants includes gelatine, albumen, and caseine. These serve to animalize, as it were, vegetable fibers. Cotton treated with albumen, for instance, behaves like an animal fiber and may then be dyed substantively with colors which otherwise would have no affinity for it. In some cases, however, these mordants act more like adhesives than true chemical fixing agents. They are better suited for calico-printing than for dyeing.

The fibers usually dyed are silk, wool, and cotton. Occasionally the material is dyed before spinning, but more frequently in the state of yarn or thread, and sometimes as woven cloth. Before the fibers are fit for the dyeing operations they must first undergo a cleansing process, the object of which is the complete removal from the fiber of all natural and artificial impurities, such as grease and dirt, as these would prevent the proper attachment of the mordant and color and produce spots or uneven shades. Bleaching is also necessary whenever light and delicate tints are to be dyed. Wool is cleansed by first washing, then steeping in soap and carbonate of soda and finally rinsing well with water. Thus is removed the natural grease of the wool. Wool is bleached by means of sulphur dioxide. Silk is cleansed in order to remove from the surface of the fiber the natural silk glue which envelops it. This is done by boiling the silk twice in soap. The liquor in which the silk was boiled last is called "boiled-off liquor," and is made use of in subsequent dyeing operations. Silk is bleached, like wool, with sulphur dioxide. Cotton is cleaned and bleached in the following way: First, a "lye boil" in weak caustic soda, then rinsed; second, "chemicking," or steeping in a solution of bleaching powder; then rinsed again; third, "souring," or steeping in dilute sulphuric acid; fourth, thorough rinsing in a washing-machine, and finally drying. For the cleaning and bleaching of cotton cloth see CALICO-PRINTING.

The operation of dyeing with the substantive colors is very easy. Simple immersion of the goods in the hot dye-bath and carefully working them beneath the surface to secure an even shade is all that is necessary. The dye-bath should be clear and free from suspended impurities, the particles of which might attach themselves to the fiber and produce spots. The full quantity of the dye is seldom added all at once to the bath, but successive portions, previously dissolved, are poured in from time to time as the dyeing proceeds, until the desired shade is obtained; the temperature of the bath is in the mean

time gradually raised. The animal fibers have such an affinity for some of the coal-tar colors that they absorb them completely, leaving the dye-bath almost colorless. Most of the aniline colors are dyed in neutral baths. Aniline blue, however, is usually dyed in an alkaline bath and some of the azo colors are dyed in acid baths. Silk is often dyed in a bath containing a little soap or some of the "boiled-off liquor" previously referred to. Very few dyes are substantive toward cotton. Safflower is dyed on cotton in a neutral bath. Alkali blue is dyed in a faintly alkaline bath and the full color subsequently developed by immersing the cotton in weak sulphuric acid. Indigo is another substantive color for cotton. The dyeing with adjective colors is usually preceded by the operation of mordanting. After the mordant has been applied, the goods are wrung out or rinsed, according to circumstances, and then immersed in the dye-bath, and the dyeing proceeded with as for substantive colors. In some cases, notably with certain colors produced with logwood and cochineal, the mordant and the dye are applied simultaneously in the same bath. The dyeing with pigment colors consists in treating the material successively with the chemical reagents necessary for the formation of colored inorganic precipitates within the substance of the fiber. The following are a few of the methods of dyeing. For further details see *Silk Dyeing, Printing and Finishing*, by Hurst, and *Dyeing of Textile Fabrics*, by Hummel.

DYEING OF WOOL. *Reds.* (1) Mordant the wool with alum and potassium bichromate and dye in a decoction of peach-wood or Brazil-wood. (2) Mordant with tartar and red spirits and then dye in decoction of ground cochineal. This gives a scarlet. (3) Aniline red (magenta) is dyed in a neutral bath. (4) Roccelline and the azo scarlets are dyed in a bath slightly acidulated with sulphuric acid. *Oranges.* (5) The best orange dyes are found among the coal-tar colors. Methyl orange, naphthol orange, and orange yellow are best dyed in acid baths. *Yellows.* (6) Mordant the wool with alum and dye with weld. This gives an olive yellow. (7) Mordanting with stannic chloride and dyeing with quercitron gives a buff yellow. (8) Using stannous chloride for mordant and dyeing with Persian berries gives a full rich yellow. (9) Turmeric may be dyed without any mordant, but alum is commonly used. (10) Aniline yellow and Martin's yellow may be dyed in neutral baths, while (11) acid yellow and the tropæolins require acid baths. *Greens.* (12) Mordant with alum and dye yellow with fustic. Then dye blue over it in indigo-vat. (13) Mordant with sodium hyposulphite and dilute sulphuric acid and then dye with methyl green or malachite green. (14) First dye the wool blue with indigo extract and then top with picric acid. *Blues.* (15) Dye in indigo-vat. (16) Dye with alkali blue in alkaline bath with borax, and develop the color by immersion in dilute sulphuric acid. (17) Methylene blue is dyed in a neutral bath. (18) Prussian blue. Impregnate the wool first with copperas, then pass through an alkaline bath, rinse, and immerse in yellow prussiate of potash. *Lilacs, Purples, and Violets.* These are frequently compound colors. (19) Mordant with tin spirits or alum and dye in a decoction of logwood. (20) The different methyl violets are dyed in a neutral bath. (21) The indulines are dyed like alkali blue. *Blacks.* (22) By mordanting the wool with potassium bichromate, copperas, or iron liquor, and dyeing in a decoction of logwood, with or without addition of fustic, various shades of black are produced. Sometimes the wool is first dyed blue in the indigo-vat and then with logwood as above. The result is a blue black.

DYEING OF SILK. *Reds.* (1) Mordant the silk with alum and dye with Brazil-wood. (2) Silk is dyed bright pink in a decoction of safflower. (3) Mordant with red spirits and tartar and dye crimson with peach-wood. Vary the shade by adding fustic, annatto, or cochineal. (4) For cochineal crimson mordant with alum and dye with cochineal decoction. For scarlet, mordant with nitro-muriate of tin. (5) Aniline red (magenta), safranin (pink), magdala red, and the eosines are dyed on silk in a weak soap bath. *Yellows.* (6) Mordant with alum and dye with weld. (7) Addition of annatto or turmeric to the preceding gives an orange shade. (8) Picric acid is dyed substantively. (9) Martin's yellow, aniline yellow, methyl orange, and tropæolin are dyed in weak soap baths, sometimes acidulated. *Greens.* (10) Dye blue with indigo extract, then mordant with alum and dye with fustic; or (11) dye blue, as in (10), and top with picric acid. (12) Methyl green is dyed in a warm soap bath, with or without picric acid. (13) Malachite green is dyed in a soap bath acidulated with acetic acid. *Blues.* (14) Prussian blue. Work the silk in iron liquor; rinse; then boil in soap and rinse again; now dye in bath of yellow prussiate of potash. (15) Dye direct with indigo carmine in a slightly acid bath. (16) Aniline blues and the indulines are dyed in baths containing some "boiled-off liquor." (17) Methyl violets are dyed in weak soap baths. *Blacks.* (18) Silk is usually dyed black with logwood, using iron salts as a mordant. The process is complicated. (19) *Browns, Grays, and Lilacs* are usually compound colors.

DYEING OF COTTON. *Reds.* (1) Mordant with tannin and basic alumina sulphate and then dye with Brazil-wood. This gives a bluish red; (2) or mordanting with tannin and red spirits and dyeing with Brazil-wood gives scarlet. (3) The most important red on cotton is Turkey red (q.v.). It is now produced entirely with artificial alizarine instead of madder. (4) Aniline red and safranin are dyed on cotton by first mordanting with tannin and tartar emetic. (5) For dyeing eosines the cotton is prepared with olive oil and alumina acetate. (6) The azo scarlets are dyed on cotton mordanted with stannate of soda and alum. (7) Congo red is one of the few coal-tar colors which are substantive for

cotton. *Yellows.* (8) Chrome yellow. Steep the cotton in acetate of lead, then immerse in potassium bichromate. The color may be deepened by subsequently boiling in lime water. (9) Weld on cotton gives with alumina mordants yellow and with chromium mordants olive colors. (10) Fustic is dyed in the same manner as weld. (11) Mordant with tin spirits and dye with quercitron. This gives a buff yellow. (12) Turmeric dyes cotton without a mordant. (13) For chrysoidin the cotton is mordanted with tannin and tartar emetic. (14) Tropæolins, orange yellow, and some other yellow coal-tar dyes require the cotton to be prepared with olive oil and alumina acetate. *Greens.* (15) First dye blue with indigo and then yellow with fustic and quercitron. (16) Mordant with tannin and dye with methyl green. (17) Mordant with tannin and tartar emetic and dye with malachite green. (18) Modify these greens by topping them with picric acid. *Blues.* (19) Prussian blue, as for wool. (20) Indigo—see separate article. (21) Methylene blue is fixed by tannin, and (22) aniline blues by tannin and tartar emetic. *Blacks.* (23) Logwood blacks are obtained on cotton by mordanting with coppers or iron liquor and then dyeing in a decoction of logwood. (24) Aniline black. The production of this black on cotton fiber is described under DYE-STUFFS.

The dyeing of mixed cotton and woolen fabrics, such as cashmeres and delaines, requires special attention. Sometimes the material is treated in such a way that the wool is dyed first, according to the methods customary for wool. After washing, it is dyed again in baths made up with a view to dyeing only the cotton. Or, as is generally the case, the two operations are combined, and the material is impregnated with mordants and dyed with colors selected with reference to dyeing the wool and the cotton at the same time. The object, of course, is to make the colors of the wool and the cotton as nearly alike as possible. Sometimes, however, the wool is purposely dyed one color and the cotton another, thus producing the effect obtained by dyeing the fibers separately before weaving. Much judgment is necessary in dyeing mixed fabrics.

A few words are in place regarding the permanency of dyed colors. The term "fast" is a comparative one and needs qualification. It is obvious that the colors ought to withstand every condition to which the materials dyed with them are likely to be subjected when in use. The colors on woolen goods and calicoes, intended to be worn daily, should be much more fast against the action of air and sunlight than the delicate colors on silks, which are less exposed. Cotton and woolen fabrics are washed much more frequently than silks, and on this account the colors with which they are dyed should be fast against soap and alkalis. Colors dyed upon fabrics intended for wearing apparel should be fast against the action of the acids contained in the perspiration. Many coal-tar colors are not fast to light, and few can withstand repeated washing with soap. All organic colors are bleached by chlorine, and some by sulphurous acid. Few general statements can be made as to which colors are fast and which are not. The fastest reds are those produced with madder or alizarine—Turkey red, for instance; cochineal reds are fairly permanent. Chrome yellow, iron buff, alizarine orange, and some tropæolins may be called fast colors. Fast greens are cœrulein and Persian berries dyed on a copper mordant. Indigo, alizarine blue, and Prussian blue are fast. Alizarine and gallein yield fast violet colors. The fastest blacks are aniline black and those produced with alizarine. The permanency of logwood blacks depends upon the particular mordants used.

DYER, a co. in w. Tennessee, on the Mississippi; 495 sq.m.; pop. 90, 19,878. Soil rich, surface level, with extensive forests of white oak, walnut, poplar, etc. Corn, cotton, lumber, and tobacco are the chief products. Co. seat, Dyersburg.

DYER, ALEXANDER B., 1817-74; b. Va.; graduated at West Point, 1837. In 1864, he was appointed chief of ordnance with the rank of brig.gen. He served in the Florida war in 1837-38; in various arsenals, 1838-46; in the war with Mexico, 1846-48; in various arsenals, 1848-61; and in the ordnance board, 1859. He had charge of the Springfield armory, 1861-64, and served in the ordnance board, 1860-63, and as chief of ordnance in the ordnance bureau in Washington, from 1865 to his death.

DYER, GEORGE, 1755-1841; b. London; antiquary, scholar, and poet; educated at Emanuel coll., Cambridge. From 1774-88 he was engaged, chiefly at Cambridge, as usher, tutor, and as minister (in the Baptist denomination), but he finally settled in London in 1792. He pub. *History of the University and Colleges of Cambridge* (Lond., 1814), and many other works.

DYER, Rev. JOHN, an English poet, was b. at Aberglasney, in Caermarthenshire, in the year 1700, and educated at Westminster school. He was intended for the law, but, however, abandoned that study for painting. In 1727, he published his poem of *Grongar Hill*, remarkable for simplicity, warmth of feeling, and exquisite descriptions of nature. He then made the tour of Italy, and returning home in bad health, took orders, and obtained some respectable ecclesiastical preferment. In his didactic poem, entitled *The Fleece* (1754), the difficult subject is treated with great success; but the unpretending tone of the poem made no impression upon his contemporaries. Another poem, *The Ruins of Rome* (1740), abounds in isolated beauties. D. died in 1758. A collected edition of his poems appeared in 1761.

DYER, MARY, one of the victims of the persecution that befell the Quakers in the early years of the Massachusetts colony. Their uncompromising attack on the organiza-

tion of both the church and the civil state, led to the enactment by the legislature of a law of banishment against them under penalty of death if they should return. Mary Dyer left the colony for a time, but soon returned, when she was arrested and convicted, but on being led forth to execution was reprieved, and, against her will, conveyed out of the colony. Returning again, she was hanged on Boston common, June 1, 1660.

DYERS' BROOM, or **WOADWAXEN** (*genista tinctoria*), a leguminous shrub of European origin bearing yellow flowers and simple leaves, and said to be the bush genet, from which the Plantagenet family took its name. It is used in Russia for preventing hydrophobia; and formerly in this country its tops were domestically used for a yellow dye, and it was extensively cultivated in New England. Its medicinal value appears to be small.

DYERS' WEED, or **ROCKET** (*reseda luteola*), a European herb, naturalized in the region of New York, resembling the mignonette. It was formerly used for medicinal purposes, but is now valued chiefly as material for a yellow dye, for which purpose it is largely cultivated in some parts of Europe.

DYE-STUFFS. This title is generally applied to all the materials used by the dyer for the production of colors on textile fibers. In its more restricted sense it indicates only those substances which are themselves the real coloring matters, and does not include those which are assistants merely, and only serve to fasten the color to the fiber. The latter class of substances, called *mordants*, are considered in the article on **DYEING**.

Coloring matters are natural or artificial, according as they are derived from plants and animals, or are the product of chemical manufacture.

VEGETABLE COLORS.—These are procured from plants of widely different natural families. They are also found in all the different parts of plants. Indigo and archil are obtained from the whole plant; madder, alkanet, and turmeric from the roots; logwood, brazil-wood, and fustic from the wood; quercitron from the bark; safflower from the petals; saffron from the anthers; Persian berries and annatto from the seed. Many coloring matters in the state in which they exist in the plant give little or no indication of their tinctorial power, but by fermentation, oxidation, or other chemical agency they yield dyes of great brilliancy. Thus the indigo plant gives no evidence that it will yield a blue dye until it is fermented, when the indican, which it contains, is split up into indigo and indigluclin. A few vegetable colors, such as saffron and safflower, are found ready formed in the plant. Most vegetable colors require the use of other chemical agents to fix them to the fiber. Some of these agents are simply astringent, like sumach or tannin; while others, like sulphate of iron, appear to combine with the coloring matter and form definite chemical compounds in the fiber. Many vegetable colors fade or change by air and light. All organic colors are bleached by chlorine and many by sulphurous acid. Vegetable dyestuffs are generally found in commerce as the dried and coarsely powdered natural substance. A few, such as logwood, brazil-wood, fustic, quercitron, and madder, are sold as "extracts," i.e., concentrated aqueous solutions of the useful portions of the plant. The vegetable colors are numerous, but few are useful.

RED COLORS.—*Madder* is the most important of this class. It is the root of the *rubia tinctoria*; alizarine and purpurine are the valuable constituents. Artificial alizarine has now almost entirely displaced madder in dyeing and printing. *Munjeet*, or *Indian madder*, is used in India instead of madder. *Brazil-wood*, obtained from the *caesalpinia echinata*, contains brazilin, $C_{16}H_{14}O_6$. *Cumwood* and *barwood* are very similar to brazil-wood. *Sandal-wood*, from the *pterocarpus santalinus*, of India, owes its dyeing properties to the santalin, $C_{15}H_{14}O_6$, which it contains. *Safflower*, the dried flowers of *carthamus tinctorius*, contains carthamin, $C_{14}H_{16}O_7$. It dyes silk and cotton without a mordant. *Annatto* is the seed of *bixa orellana*. The tinctorial constituent is bixin, $C_{28}H_{34}O_5$. *Archil*, *Cudbear*, and *Litmus* are obtained from the sea-weed *rocceella tinctoria*. The coloring matters do not exist in the weed ready-formed, but are developed by exposing it to the action of ammonia, air, and moisture. They are used chiefly for dyeing silk. *Alkanet* is the root of *anchusa tinctoria*; its coloring matter is alkanin, $C_{15}H_{14}O_4$.

YELLOW COLORS.—Yellow is the most abundant color in the vegetable world. *Berry root*, imported from the East Indies, owes its dyeing property to berberine, $C_{10}H_{17}NO_4$. *Fustic*, or *yellow-wood*, the heart-wood of *morus tinctoria*, is seldom used alone in dyeing. Generally it is mixed with other colors to produce drabs, olives, etc. *Quercitron*, the bark of *quercus tinctoria*, yields a rich orange yellow dye (see **BUCKTHORN**), which gives useful mixed shades. It contains quercitrin, $C_{36}H_{38}O_{20}$. *Persian berries*, obtained from *rhamnus cathartica*, yield a deep yellow color. *Saffron*, from the flowers of the *crocus sativus*, of southern Europe; *Aloes*, from the sap of the *aloë sinuata*, of the East Indies; *Weld*, the entire plant of *reseda luteola*, cultivated in Europe; and *Turmeric*, the root of *curcuma tinctoria*, of China, are all useful yellow dyestuffs.

GREEN COLORS.—There are very few of these, most green shades being obtained by mixtures of blue with yellow dyes. *Lo-Kao*, or *Chinese green*, prepared by the Chinese from the entire plants *rhamnus utilis* and *r. chlorophorus*, is very scarce and expensive. *Chlorophyll*, the green coloring matter of plants in general, and *Sap green*, from the berries of *rhamnus catharticus*, are fugitive colors.

BLUE COLORS.—*Indigo* (q.v.) is the most important of these. It is prepared from *indigofera tinctoria*, and the entire plant is used. *Woad* is the *isatis tinctoria* of India.

and is extensively used as an addition to the indigo vat. *Logwood*, or *Blue-wood*, comes from the tree *hæmatoxylin campechianum*. The active principle in it is hæmatoxylin, $C_{16}H_{14}O_6$. It gives, with alumina mordants, blue, and with iron mordants, blue-black colors. Violets, browns, drabs, olives, and blacks are compound colors produced by mixing two or more vegetable dyestuffs.

ANIMAL COLORS.—The chief animal dyes now in use are : *Cochineal* (q.v.), the product of the insect *coccus cacti*, cultivated in Mexico; *Kermes* (q.v.), that of the insect *coccus ilicis*; and *Lac dye* (q.v.), obtained from a resin colored by the insect *coccus lacæ*. The tinctorial principle contained in these three is carminic acid, $C_{17}H_{15}O_{10}$. The *Tyrian Purple* of the ancients is believed to have been obtained from a mollusk.

MINERAL COLORS are insoluble metallic compounds developed within the textile fibers by the successive application of suitable chemical reagents; or, they may be previously prepared and then fixed to the fiber by an adhesive. They are not true dyes, but pigments (q.v. under PAINTS). *Chrome yellow* or *Chromate of lead*, *Prussian blue*, *Iron buff* or *Ferric oxide*, and *Bistre* or *Manganese oxide* belong to the first class, while *Ultramarine*, *Chrome green*, and *Vermilion* belong to the second. Mineral colors are more suitable for calico-printing than for dyeing. More detailed information regarding most of the dyestuffs mentioned under vegetable, animal, and mineral colors will be found under their respective names.

COAL-TAR COLORS.—Within the last 20 years modern chemistry has furnished the dyer with many beautiful colors prepared from materials extracted from the refuse tar produced by the distillation of bituminous coal in the manufacture of illuminating gas. These colors are generally produced in aqueous solution and precipitated therefrom in a pulverulent or crystalline state by the addition of common salt. When filtered out, washed and dried, they are ready for the market. The coal-tar colors are usually soluble in water. They possess a natural affinity for animal fibers, and the shades produced upon silk and wool are particularly brilliant. Coal-tar colors are not classified according to their tinctorial power or the shades they produce. A classification founded strictly upon their chemical constitution is of interest only to the theoretical chemist, and would be out of place here. The following arrangement has the advantage of simplicity :

I. ANILINE COLORS.—The most important of this class is *Rosaniline*, also called *Fuchsine* or *Magenta*. It is prepared by heating a mixture of aniline and toluidine with arsenic acid. The color is a base, and is sold as the hydrochloride or acetate. It dyes silk and wool a magenta shade. *Methyl violet* or *Paris violet* is prepared by heating together dimethylaniline, copper nitrate, common salt, and acetic acid. It is a very beautiful and useful color. It dyes wool and silk in a neutral bath. If methyl violet is heated with methyl chloride the product is *Methyl green*, a color chiefly used for dyeing silk. *Aniline blue*.—In order to prepare this the best quality of magenta is heated in a retort, with a large excess of aniline. Being soluble in alcohol it is sold as *spirit blue*, and is useful only for silk. When spirit blue is heated to $35^{\circ} C.$, with sulphuric acid, the result is *Alkali blue*. This color is dyed on wool and silk in an alkaline bath and the color subsequently developed by immersing the material in dilute acid. In the treatment of spirit blue with sulphuric acid, if the temperature is raised to $110^{\circ} C.$, *Water blue* or *Cotton blue* results. This color is soluble in water and is chiefly applied to cotton. *Benzaldehyde green* or *Malachite green*.—Benzaldehyde and dimethylaniline are heated together with zinc chloride, and the resulting compound is oxidized by manganese dioxide. The commercial article is a double zinc salt. *Chrysaniline* or *Phosphine* is an orange dyestuff extracted from the residues of the manufacture of magenta. Its application is limited to silk and woollen printing. *Mauve* or *Perkin's violet* is produced by the oxidation of aniline with chromic acid. As a dyestuff it is obsolete. By heating aniline with amido-azo-benzol, *Induline* is formed. This dyes silk and wool various shades, ranging from blue-gray to blue-black. It is applied like alkali blue. *Safranine* is prepared by passing nitrous acid into a mixture of aniline and toluidine, adding more toluidine and then oxidizing the mixture with chromic acid. *Safranine is chiefly used for silk, which it dyes a beautiful pink. *Aniline black* is only suitable for cotton dyeing and calico-printing. It is usually produced when wanted directly upon the fiber. The cotton yarn is worked in a bath of aniline, hydrochloric acid, and potassium bichromate. The material turns first green and then black from the formation within its fibers of aniline black. Cotton cloth is printed with a thickened mixture of aniline hydrochloride, chlorate of potash, and sulphide of copper, and then hung up in a warm moist atmosphere. The black is formed wherever the mixture was printed. Aniline black is very intense and permanent. *Methylene blue*.—This color contains sulphur. It is only used for wool and cotton, on which it produces shades similar to indigo. Methylene blue is extensively used in calico-printing. *Magdala red* or *Naphthalene red*.—This magnificent color is obtained from naphthylamine in the same manner as induline is prepared from aniline. It is the hydrochloride of a base, and its composition is $C_{20}H_{20}N_4 \cdot HCl$. It is used only for dyeing silk, to which it imparts a beautiful pink color with a strong fluorescence.

II. NITRO COLORS.—*Picric acid* or *carbazotic acid* (q.v.), formed by treating phenol with nitric acid, dyes silk and wool a light greenish yellow. It is not fast, and is poisonous. *Victoria yellow*, from cresol and nitric acid, dyes silk and wool yellow, with a slight cast of orange. *Martius yellow*, from α naphthol, sulphuric and nitric acids, dyes wool and silk a full golden yellow, but the color is fugitive. *Aurantia*, from

diphenylamine and nitric acid, dyes silk and wool orange yellow. *Naphthol yellow S*, is a sulphuric acid of Martius yellow, and is prepared indirectly. It is used for silk and wool, and is permanent.

III. AURINE COLORS.—To prepare these, phenol is heated for some time with oxalic and sulphuric acid. The product is *yellow coralline*. This yellow coralline, on being heated with strong ammonia, is converted into the *Red coralline* or *Peonine*. These colors are "spirit soluble" if in the pure state, and "water soluble" if sold as alkali salts. They are not used for dyeing, but for printing on wool and silk, the color being fixed with albumen. *Rosolic acid* is prepared from magenta by treating it with nitrous acid in aqueous solution. The colors of this class are now only of secondary importance.

IV. PHTHALIC ACID COLORS—PHTHALEINS.—*Fluorescein*, prepared by heating phthalic acid with resorcin, is the first of this class. The solution of fluorescein in alkaline water is light yellow, but it has a magnificent green fluorescence. *Fluorescein*, when treated with bromine, gives the tetrabromine derivative known as *Eosine*; when treated with iodine, it forms the tetraiodine compound called *Erythrosine*. *Aureosine* is a chlorinated fluorescein, while *Safrosine* is a nitro-derivative. *Rose Bengale* is a dichlor-tetraiodo compound of fluorescein. All these dye silk and wool various shades of pink, which are extremely beautiful and delicate. They are easily applied and fairly permanent. *Gallein* is formed by the action of phthalic acid on pyrogallic acid, while *Cærulein* is made from gallein by treatment with sulphuric acid. *Gallein* and *cærulein* are only used for printing calico, on which the former gives violet shades and the latter olive green.

V. AZO COLORS.—The dyestuffs in this class are all produced by the aid of nitrous acid. They may be subdivided into three groups: (1) The nitrous acid acts on a base, such as aniline, and the resulting compound is at once combined with the same or another similar base. Thus aniline, treated with nitrous acid and then with more aniline, gives *Aniline yellow*; or, if treated with phenylene diamine instead of more aniline, the result is *Chrysoidine* (orange). If phenylene diamine alone be treated with nitrous acid *Bismarck brown* is formed. (2) The nitrous acid acts on the sulphonic acid of aniline, and then a base is added. Thus are produced, with aniline as the base, *Fast yellow*; with dimethylaniline, *Methyl orange*; and with diphenylamine, *Tropæolin orange*. (3) The nitrous acid acts on the sulphonic acid of a base, and the compound so formed is combined with a phenol. Thus are obtained *Tropæolin yellow*, *Chrysolin*, *Naphthol orange*, *Orange yellow*, *Xylidine ponceau*, *Roccelline*, *Biebrich scarlet*, *Congo red*, and innumerable others. The azo dyes are useful permanent colors.

VI. ARTIFICIAL INDIGO.—The synthesis of indigo was accomplished by Baeyer in 1880. His success was the result of long study and painstaking labor. In brief, his process is as follows: Benzaldehyde is treated with sodium acetate; the result is cinnamic acid, $C_6H_5 \cdot CH:CH \cdot COOH$. Nitric acid converts this into ortho-nitro-cinnamic acid, $C_6H_4(NO_2) \cdot CH:CH \cdot COOH$. Bromine, acting on this, forms ortho-nitro-cinnamic acid dibromide, $C_6H_4(NO_2)CHBr \cdot CHBr \cdot COOH$. Caustic potash is now added, and there is formed ortho-nitro-phenyl-propionic acid, $C_6H_4(NO_2) \cdot C \cdot C \cdot COOH$, the final product, which is sold to the calico printer. When wanted for use it is made alkaline with borax, thickened with starch, and, after adding glucose for a reducing agent, printed upon the cloth. On hanging in the air the cloth turns blue, wherever the mixture was printed, from the formation of indigo by the reducing action of the glucose upon the ortho-nitro-phenyl-propionic acid. Artificial indigo is expensive, and is not now used.

VII. ANTHRACENE COLORS.—*Alizarine* is the most important color of this class. It was first prepared synthetically by Graebe and Liebermann in 1869, and was the first example of the artificial production of a vegetable dyestuff. *Alizarine* is the chief tinctorial constituent of madder (q.v.). It is now prepared from anthracene on an enormous scale by the following process: the anthracene, $C_{14}H_{10}$, is first oxidized to anthraquinone, $C_{14}H_8O_2$, and this is heated with fuming sulphuric acid, producing anthraquinone sulphonic acid. The latter compound is converted into alizarine by melting it with caustic potash. The alizarine is sent to market in the form of a yellowish paste containing about 80 per cent water. It is chiefly used for dyeing and printing cotton, and is applied like madder. With alumina mordants it gives shades from pink to red, and with iron mordants from violet to black. *Alizarine orange*, is prepared by treating alizarine with nitric acid. It is applied like alizarine, and it dyes yellower shades. *Alizarine blue* is produced by heating alizarine orange with glycerine and sulphuric acid. It is usually printed on calico with a chromium mordant, and gives a fine deep blue. All the alizarine colors are permanent. The well-known turkey-red is now produced entirely with artificial alizarine.

DYING DECLARATION. By the law of all nations, the declaration of a party, made in the immediate prospect of death, relative to the mode of his death, is received as evidence. The ground of this exception to the general rule of law, that hearsay evidence is inadmissible, is thus clearly stated by lord chief baron Eyre. "That they are declarations made in extremity, when the party is at the point of death, and when every hope of this world is gone; when every motive to falsehood is silenced, and the mind is induced, by the most powerful considerations, to speak the truth: a situation so solemn and so awful is considered by the law as creating an obligation equal to that which is imposed by a positive oath in a court of justice." In Scotland, the dying declaration of a witness is admissible even though he is not himself conscious of the danger of death.

In this respect, the law of Scotland differs from that of England and America. The general rule as to dying declarations are, that they cannot be received in any civil case, and in criminal cases only where the death of the deceased is the subject of the charge, and the circumstances of the death are the subject of the dying declaration. They must be made, except in Scotland, with the full knowledge of impending death; they are subject to the ordinary rules of law as to capacity to give evidence; they must relate to facts only, and not opinions, and must be freely made; they must be complete in themselves, and if it appear that the dying man intended to qualify them, they cannot be received. See Taylor on *Evidence*.

DYKE, or **DIKE** (Dutch, *dyk*), an artificial mound along the bank of a river or seashore, erected for the purpose of preventing inundation. The term is from the same root as *dig*—hence also *ditch*, or the hollow from which the D. is formed. The French employ the term *levée* to signify this species of embankment, of which there is a notable example in the *levées* erected along the Mississippi near New Orleans. The principle on which dykes or levés are formed is very simple. The embankment must be of sufficient breadth and height to resist the pressure of the water, and must be constructed with that easy slope which will allow the floods to rise without any particular impediment. This is quite understood in practical engineering. Flowing water must not be abruptly resisted, but suffered to rise gradually and expend itself. It is accordingly of the first consequence, in all attempts to restrain water by embanking, that the mounds should possess not only magnitude, but a very gradual rise in the side which has to resist the impact of the flood. For want of attention to this method of embanking, there has often been much ineffectual dyking of the sea and rivers liable to do damage by flooding.

In no country has the erection of dykes been carried to such a length as the Dutch Netherlands. Consisting to a large extent of low meadow-land, formed of materials brought from Switzerland and Germany by the Rhine, there is a constant liability to be deluged by the several branches of that river previous to their entering the sea. Inspired by a sense of their perilous situation, as well as a naturally industrious and painstaking disposition, the Dutch have for ages been distinguished for their ingenious system of river-embanking; till at length the dykes of Holland are spoken of as almost one of the wonders of the world. While the country generally is guarded against sea-inundations by high mounds of sand or dunes, created by the deposit of light sand blown from the level shores (see **DUNES**), the interior is secured from the rivers by the system of dykes here referred to. These ramparts are in appearance long green mounds, broad at the base, graduated in their slope, and often of sufficient width to admit of a canal or road, or both, being formed along the top. To give strength to the fabric, willows are planted and also interwoven like wicker-work on the sides. Carried along the banks of rivers, and in some places along the margin of the sea, as well as crosswise in different parts of Holland, a singular network of embanking is presented, which answers the double purpose of a protection from inundation and a means of having canals, by which superfluous water pumped from the meadows, or *polders*, may be run off into the sea. The whole system of dyking is placed under local and general superintendence, at a considerable cost to the public. One of the most gigantic of these dykes is that along the Helder; it measures about 6 m. in length, 40 ft. broad at the summit, along which there is a good road, and descends into the sea by a slope of 200 ft., inclined about 40 degrees. Notwithstanding the precautions taken, one or other of the lower branches of the Rhine occasionally overflows its banks and lays a wide district of country under water. One of these inundations took place in the winter of 1860-61, and, committing immense havoc, was the cause of much loss and suffering. A good example of dyking for the purpose of drainage is shown near Haarlem, where it has facilitated the withdrawal of the Haarlem lake (q. v.).

DYKES. In volcanic districts, rents frequently occur which are filled with molten materials from below, that subsequently solidify, and form solid walls, filling the fissures, and separating the edges of the disjointed strata. To these walls, geologists apply the term *dyke*, a Scottish word for a wall or fence. Similar walls of intruded matter occur in stratified rocks of all ages, and have been connected with volcanic eruptions belonging perhaps to every geological epoch. They consist of similar materials to whatever period they belong—viz., lava, either in a granular, compact, or glassy condition. The D. connected with Vesuvius have been minutely described. Those in the great escarpment which Somma presents to the modern crater of Vesuvius permit of a careful examination. They are chiefly vertical, and traverse at right angles the beds of lava, scoriæ, breccia, and sand which form the ancient cone. They project in relief several inches, or sometimes feet, from the face of the cliff, being extremely compact, and less destructible than the intersected tufts and porous lavas. In vertical extent they vary from a few yards to 500 ft., and breadth from 1 to 12 feet. Many of them cut all the inclined beds in the escarpment from top to bottom, others stop short before they ascend above half-way, and a few terminate at both ends, either in a point or abruptly. In mineral composition, they scarcely differ from the lavas of Somma. Their texture is different at the edges and in the middle; towards the center, the rock is larger grained, while at the edge it is always finer grained, sometimes vitreous. This evidently arises

from the rate of cooling, it being known that molten trap or lava, when suddenly cooled, assumes a vitreous structure, while a slow cooling, as it permits the mass to remain in a condition fitted for the operation of the crystalline force, and the segregation of the separate materials, produces a more or less granular structure, in proportion to the time occupied in cooling. The rock forming the D. is far more compact than that of ordinary lava, for the pressure of a column of melted matter in a fissure greatly exceeds that in an ordinary stream of lava; and pressure checks the expansion of those gases which form vesicles in lava. When the fissures have been openings for the egress of molten matter, the surfaces have been worn and smoothed by the current, the intense heat having melted all projections and obstructions to the passage of the incandescent fluid.

The appearances of ancient trap-dykes are very similar to those of recent volcanic dykes. Trap-dykes generally are prominent objects in the landscape, because, while the softer rocks through which they have intruded have been abraded by the sea, rivers, or rain, they, being more compact, stand out prominently in the face of precipices or on the level surface of a country. Sometimes, however, from chemical action, and chiefly from the oxidation of the iron which all trap-rocks contain to a greater or less extent, the intruded dyke decomposes more rapidly than the containing rock. It then for some feet or yards leaves the original fissure again unoccupied. A singular modification of this arrangement may sometimes be noticed, when the intrude digneous rock has so indurated the beds through which it passed as to make them less liable to weather than the unaltered portions of the beds, or than even the dyke itself. In such cases, we find two parallel walls of indurated strata rising above the general level of the country, and forming the banks of a ditch produced by the disappearance of so much of the dyke.

DYMOND, JONATHAN, 1796-1828 ; an English writer, a member of the Society of Friends. He was an expositor of the moral principles of his sect, and though actively engaged in business, published, in 1823, an *Inquiry into the Accordance of War with the Principles of Christianity*, which attracted wide attention. He also wrote *Essays on the Principles of Morality, and on the Private and Political Rights and Obligations of Mankind*, published after his death.

DYNAMETER, an instrument for measuring the magnifying power of a telescope. The power of a telescope is found by dividing the solar focal distance of the object glass by the focal distance of the eye-piece; which quotient equals that of the effective diameter of the object glass, by the diameter of the image formed at the solar focus, and seen through the eye-piece. The object of the dynameter is to measure the diameter of this image. Ramsden divided a positive eye-piece into two equal parts, and caused the halves to slide along at the dividing line, by means of a fine screw apparatus. Each half lens gives a separate image, and the distance of the two centers, measured by the turns of the screw which bring the images into contact, gives the distance between the centers of the images, or the diameter of one of them.

DYNAMICS is that division of mechanics (q.v.) which contains the doctrine of the motion of bodies produced by forces. It is essentially a science of deduction from the laws of motion (see MOTION, LAWS OF), under which head will also be found a brief sketch of the growth of the science. The branches of D. capable of being treated in the present work will be found discussed under separate heads. We shall here confine ourselves to giving a view of the main branches and their correlation. I. The first branch of D. deals with the fundamental conceptions of the science, their names and definitions, such as velocity (q.v.) and the different kinds of motion (q.v.), and accelerated motion (q.v.); force, accelerating force, and moving force (see FORCE). Under this branch also falls the composition of motions (see COMPOSITION OF FORCES AND MOTIONS). II. The second main branch of D. treats of the motion, free or constrained, of points. Here two problems are solved in each case—i.e., whether the motion be free or constrained—viz., a direct and an inverse problem; as, for example: 1. To determine the path of a point when the forces are given which act upon it; 2. To determine the forces or force acting on a point when its path is given. This division of dynamical problems into direct and inverse, obtains in all the branches. It may be mentioned that it was by solving the inverse problem that Newton and Huygens effected their greatest glories in connection with dynamics. The method of treating the case of a free point now generally employed, is due to Euler. See, under this head, CENTRAL FORCES; FALLING BODIES, and PROJECTILES. III. The third main branch of D. is concerned with the motion of a rigid system of points, or of a solid body. Few of the sub-branches of this part of D. are capable of exposition in this work, but see CENTER OF GYRATION, CENTER OF OSCILLATION, CENTER OF PERCUSSION, and PENDULUM. The honor belongs to D'Alembert of establishing a general method of treating problems in rigid dynamics. Previous to his time, each set of such problems was treated on some principle peculiarly applicable to itself. D'Alembert invented one (which goes by his name) applicable to all such problems. For a statement of this principle, see RIGID DYNAMICS. IV. The fourth main branch of D. is concerned with motions of rotation. A system of rigid points may be subject to two independent kinds of motion. It may suffer a motion of translation in space, or a motion of rotation about some point or axis within itself, or it may suffer at once a motion of translation and a rotatory motion.

These may clearly be treated conjunctly or independently; they are now uniformly treated independently, by investigating, 1. The velocity and direction of the center of gravity of the system; and 2. The direction at each instance of the spontaneous axis of rotation passing through the center of gravity (see ROTATION), and the velocity of the rotation of the system round that axis. To effect the second task, Poinsot proposed his theory of couples (q.v.). For the conservation of living forces (*virium vivarum*), and the principal of least action, see FORCE. See also MOMENT. D. is used by some recent writers with a wider signification, as denoting the science which investigates the action of force (1) in compelling rest or preventing change of motion, and (2) in producing or changing motion; the former branch being called *statics*, and the latter *kinetics*.

DYNAMIC UNITS are units for measuring forces and their effects. It is an axiom of mechanics that if a body at rest be impressed by a momentary force, and meet no resistance other than its own inertia, it will move in a straight line with a velocity dependent upon the initial force; e.g., twice the force will develop twice the velocity. Also, if the mass of the body be increased, the force must be increased in like ratio to impart the same velocity; e.g., double the mass will require double the force; or, if the force remain unchanged, double the mass will move with half the velocity. Combining the two statements, we find that the velocity varies directly as the force, and inversely as the mass; velocity equals force divided by mass, or $v = \frac{F}{M}$. From this we have $F = Mv$.

The unit of force is that force which will impart a unit of velocity to a unit of mass; that is, which will cause a unit of mass to move through a unit of space in a unit of time. If the force considered be that of gravity (*g*), whose action in the same place is practically uniform, and if we remember that the measure of the force of gravity upon a body is the weight (*w*) of that body, we have $W = Mg$. If the force of gravity act upon a mass for one second, it will impart to it a velocity of 32.16 ft. per second, at New York, approximately. $g = 32.16$ ∴ $W = Mg = Mv$, or $W = M \times 32.16$, whence $M = W \div 32.16$.

In $W = Mv$ substitute $v = \frac{F}{M}$, whence $W = \frac{MF}{M} = F$. The English and American unit of force is the weight of a pound mass avoirdupois; and the corresponding unit of mass is one pound divided by 32.16. The term "pound," used as a unit of force, must be understood to mean the *force* exerted on a pound mass at some particular locality, i.e., New York or London.

The *unit of work* is the amount of work which will raise a unit of weight through a unit of space. The two items are indicated in the name foot-pound, which by analogy might be exchanged in proper ratio for inch-ounce, mile-ton, etc. The French unit of work is the metre-kilogram. The horse-power is an arbitrary unit, being the force required to perform 33,000 units of work or foot-pounds, per minute. It may be called the *unit of rate of working*. The French *cheval a vapeur* is 75 metre-kilograms per second, and is equivalent to 32.550 foot-pounds per minute, or a little less than our horse-power. The theoretical horse-power is merely a conventional quantity, the actual work of horses averaging about 17,000, and rarely exceeding 32,000 foot-pounds per minute.

DYNAMITE, a powerful explosive compound, now much used in mining, in breaking up old metal, in torpedoes, etc. The names lithofracteur, glyoxiline, nitrate of methyl, etc., are applied to the same or similar substances, of which nitro-glycerine is the main ingredient. See NITRO-GLYCERINE, EXPLOSIVES.

DYNAMITE CRUISER, THE. The name *Vesuvius* was bestowed upon the first dynamite cruiser built by any of the naval powers, and the vessel was constructed by contract under an act of congress appropriating the sum of \$350,000 for the purpose. The name dynamite cruiser is considered rather a misnomer by experts, who are of the opinion that she will never use that explosive, but that gun-cotton or some other high explosive more safely handled than dynamite will be selected. What the vessel really is intended for is the projection of a large mass of high explosive to a distance.

Her appearance is very similar to an enlarged torpedo boat, having a low freeboard of but 5 feet, no bulwarks, great crown to her deck, approaching that of an ordinary turtle-back, and great length in proportion to her beam. Her dimensions are: length on water line, 239 feet; length over all, 246 feet; extreme beam, 26 feet 6 inches; depth from base line to top of gunwale, 13 feet; mean draught, 9 feet 3 inches; displacement, 810 tons. She is built of steel, with the exception of the stem, stern-post, and rudder, which are of forged iron. The framework is very light, and is in one piece from keel to gunwale, weighing but 7 pounds per lineal foot, while the reverse frames weigh but 4 pounds per lineal foot. The deck plating is but $\frac{3}{8}$ inch thick and is planked with white pine. Water-tight bulkheads $\frac{1}{2}$ inch thick divide the vessel into a number of compartments, each of which has its individual drainage. A steel conning tower 1 inch thick is situated forward.

The three-bladed twin screws are worked by two vertical, four-cylinder, triple-expansion engines of about 4,000 indicated horse-power. The diameters of cylinders are: high powered, 21.5 inches; intermediate, 31 inches; and the two low powered, 34 inches; the length of stroke is 20 inches and the estimated piston speed 930 feet. Steam is supplied by four three-furnace locomotive-boilers, 9 feet in diameter, 19 feet 8 inches long, with a grate surface of 200 square feet. The coal capacity is 150 tons.

The main armament is three pneumatic tubes, fifty-five feet long, side by side, and built into the forward part of the vessel at an angle of 18° with the horizon. The muzzles project slightly above the deck near the bow. The only train that can be given the gun is by the helm, the shells being thrown in the line of the keel. The range is varied by increasing or decreasing the pressure of air admitted into the tubes. The secondary battery is composed of three 3-pounder rapid-fire guns so mounted as to command the entire horizon. The vessel is well fitted with a complete electrical outfit, a single plant rather than the customary double one being deemed sufficient. It may be used for a search light of minor power and for a certain number of incandescent lamps.

The speeding trial took place on January 11, 1889. The vessel displacing 810 tons was run twice over a measured base 2.54 knots long. The trials were made in Delaware bay near the end of the ebb tide. The first run, with the tide, gave a speed of 22.95 knots, the second, against the tide, 20.35 knots, or a mean speed for the trial of 21.65 knots, 1.65 knots above the 20 knots the contract required. The mean boiler pressure was 160 pounds, and the mean number of revolutions, 271.85. A progressive trial resulted in 10.6 knots with 125.3 revolutions, 14.9 knots with 175.75 revolutions, and 18.9 knots with 230.6 revolutions. The coal allowance of 150 tons gives a steaming radius of about 5800 nautical miles, at a speed of 10 knots.

In addition to the above trial, the ability of the vessel to project a shell every two minutes was conclusively proven, as was the possibility of throwing large masses of gun cotton without danger from explosion. Later tests, however, were less satisfactory.

DYNAMITE GUN, THE. The portion of a ship which can be protected from high-power guns of even medium calibres, is now reduced to a mere citadel, as at the present date the gun has practically overpowered the armor which may be carried afloat. The mere momentary supremacy of the armored protection of the over-water hull led to greater activity in the development of the submarine torpedo attack. This having been brought to a point where it has necessitated consideration, the under-water hull has been strengthened somewhat, and cellular subdivision renders the relatively small charges used heretofore in movable submarine torpedoes ineffective. Now, however, we are presented with the pneumatic torpedo-gun, which is capable of accurately throwing very large charges of high explosives to greater distances than those attainable by movable torpedoes. Perforation of the over-water hull by ordinary projectiles is likely to produce only local injury, whereas the crushing-in of the under-water hull is more certain to be fatal, the more heavily the ship is weighted with armor. Considerations of this nature have been the great incentives for the development of the pneumatic dynamite gun. Mr. Mefford, of Ohio, was the inventor of a 2-inch gun for the propulsion of high explosives in 1883, and at the close of that year Lieutenant E. L. Zalinski, 5th U. S. Artillery, became interested in the idea, and has ever since been actively interested in its perfection. Following the 2-inch gun came consecutively the 4-inch, 8-inch, and 15-inch guns, and the building of the dynamite cruiser (q.v.) *Vesuvius*. In the various steps that have been taken the form of the gun and of its carriage have been considerably modified, and its range has been greatly increased. The principal points of improvement are the balancing of the barrel of the gun on hollow trunnions, and mounting it on a carriage which can be turned through an entire revolution, the application of motors for elevating and training the gun, and the firing mechanism by means of which great accuracy in firing is secured, and all errors from personal equation are eliminated. The gun is a smooth bore, and is made of cast iron in several sections, provided with flanges which are bolted together, forming a tube having a length of fifty feet and an internal diameter of fifteen inches. The joints are provided with packing which automatically tightens with the increase of pressure. The trunnions communicate with an annular air space surrounding the barrel between them and the breech, and turn in boxes which convey air to the trunnions in whatever position they may take. A bronze sector attached to the under side of the gun within the carriage, is engaged by a worm arranged to be operated by an electric or water motor. There is a circular rack at the base for training the gun, also worked by water or electricity. In addition hand gear is supplied for the above purposes. There is a quick-closing breech piece which packs itself automatically as soon as the air pressure is exerted upon it. The main firing valve is operated by air pressure controlled by an auxiliary valve, the latter in turn controlled by another at the trunnions, operated by the gunner, who occupies the platform at the left side of the carriage. An arrangement of pneumatically worked pistons and valves operate the opening of the main firing valve automatically. After the firing lever has been moved, the gunner has no control whatever over the speed of the movement of the main valve, the entire operation proceeding with mathematical accuracy. The loading and firing mechanism is arranged on the interlocking plan, so that the different operations must succeed each other in regular order, insuring safety to the gun and its operators, and saving considerable time. The total weight of the full calibre projectile is 1000 pounds, the charge of high explosive alone weighing 500 pounds. The range of the gun at 35° elevation with the large projectile is 2400 yards; with a 10-inch sub-calibre projectile weighing 500 pounds, it is 4400 yards; with an 8-inch weighing 340 lbs., it is 5000 yards, and with a 6-inch it is 6000 yards. The weight of the explosive charges in the sub-calibre projectiles is respectively 200, 100, and

50 pounds. The full calibre shell is retained in its proper trajectory by a tubular tail piece having affixed thereon spiral steel vanes, which serve to rotate the shell and keep it point foremost. The sub-calibre shell may be of any diameter smaller than the bore of the gun; they are kept centred in the bore by an attached gas-check of the full size of the bore, and by centring pieces attached to the body of the shell near the conical point. These are loosened from the body by the air pressure when the gun is fired, and leave the projectile when clear of the muzzle. Spiral vanes attached to the rear of the shell retain it in its trajectory. The firing pressure in the air reservoirs is 1000 lbs. per square inch. This pressure is kept up by a supply from storage reservoirs containing air under a pressure of 2000 lbs. per square inch. The reservoirs are spherical, six feet in diameter, and made of cast steel. A most ingenious electric fuse, invented by Lieut. Zalinski, is fitted to the shell and consists of four parts, the electric battery, circuit breaker, low-tension igniter, and detonating cap. If delay action is required, a slow-burning train is inserted between the igniter and the cap. A double dry battery is placed in the point and at the rear end; the shell entering the water wets the elements and sets up a current which goes through a primer and ignites a detonator. The shell, striking any solid, crushes in the point, which closes the circuit of a wet battery also inserted in the shell, and explodes the charge.

DYNAMO. See MAGNETO-ELECTRIC MACHINES.

DYNAMOMETER, a device for measuring the force which does work in overcoming resistance and producing motion. The foot-pound, as a unit of work, has for its factors the force acting and the distance through which it acts. The larger unit, the horse-power, besides these factors has a third, the time during which the force is exerted. Hence, in getting the data from which the work of a machine is to be calculated, we are to observe the force, the distance, and the time required to accomplish a certain result. Strictly speaking, the dynamometer indicates the first of these items, but it may be so arranged as to show both the others. Dynamometers are designed to indicate the force of *traction, of thrust, or of rotation*. A traction dynamometer may be interposed, for example, between a team of horses and a reaper or a plough, to measure the force exerted by the horses in drawing the machine. It is usually some sort of spring balance, fitted with an index and a scale; the figures on the scale show the number of pounds required to bring the index to the corresponding points, if the instrument were hung up and weights suspended by it. A dynamometer for thrust is often connected with the screw-shaft of a steamship, to measure the force with which the screw is driving the vessel through the water. Rotary dynamometers measure the force of a mill-shaft, either by showing what force is required to hold the shaft in check, by absorbing the motion, or what force the shaft transmits to other machinery. Nearly all forms of dynamometers are too complex to be described without the help of elaborate drawings and technical descriptions, for which the reader is referred to special works on mechanism. The use of the dynamometer in skillful hands has acquired great value in exchanging the rough and usually overestimated guesses of the efficiency of machines for the exact determination of their performance.

DYNASTY, in the general use of the word, refers to a line of succession of sovereigns of the same family or race. Thus in ancient Egypt there were thirty different dynasties, or lines of native sovereigns. In French history we speak of the Bourbon dynasty, that is, the sovereigns of the Bourbon family, and in English history, of the Plantagenet and Stuart dynasties.

DYRRHA'CHIUM. See DURAZZO.

DY'SART, a royal, parliamentary, and municipal burgh and seaport in the s. of Fifeshire, on the rocky shore of the firth of Forth, 12 m. n.e. of Edinburgh. It chiefly consists of 3 streets, with a small square. In the High street are many antique houses.

DYSCRA'SIA (Gr. *dys*, difficult, and *krâsis*, a mixture), a pathological term much used in Germany by certain authorities, to indicate an altered condition of the blood and fluids of the system, leading to constitutional diseases, as dropsy, cancer, delirium tremens, lead-poisoning, etc. See CACHEXIA and DIATHESIS.

DYSCHROMATOPSY. See COLOR-BLINDNESS.

DYSENTERY (Gr. *dys*, difficult, and *enteron*, the intestine), a form of disease attended by discharges from the bowels, and differing from diarrhœa (q.v.) chiefly in being attended by marked fever and pain, as also by the presence of blood and inflammatory products in the discharges. Dysentery is, in fact, a disease of the mucous membrane of the colon (q.v.) or great intestine. Two forms of dysentery are recognized by medical authorities, sporadic and epidemic. The causes, however, are supposed to be the same in both. It is essentially a disease of hot weather, or hot climates. There being no doubt of the epidemic character of the disease in certain seasons and in certain localities, it follows that a peculiar poison must be the generating cause, heat perhaps operating to aid in generating the poison or contagious matter. Post-mortem examinations show the mucous membrane of the colon and rectum (see ALIMENTARY CANAL) to be the seat of much morbid action. Extensive ulcerations are frequently found, which are the seats of the hemorrhage or bloody discharges, having been caused by the inflammation of the parts, abundant evidence of which exists, the membrane often being found greatly engorged with blood, thickened and pulpy, in some cases of a very dark color and almost disorganized. The portal circulation (see LIVER) is greatly obstructed

in nearly all cases, probably in all severe cases, and it is certain, under the circumstances, that the peculiar *materies morbi* or morbid principle or matter of dysentery paralyzes or greatly arrests the functions of this organ. Now, as all the blood from the intestines passes through the liver on its return to the lungs and heart, the functional disturbance which exists in this organ must necessarily produce more or less obstruction in the capillary circulation in the intestines, and greatly interfere with their nutrition and relative functions. Practically, therefore, the treatment of the disease involves the consideration of those remedies which are supposed to exert a decided influence upon the functions of the liver. One of these remedies, which has been greatly lauded, and also greatly condemned, is mercury, particularly that preparation of it called *calomel*; one party contending that the administration of the drug in minute and repeated doses (especially when alternated with alkaline carbonates to restore the alkalinity of the blood) exerts a powerful influence in restoring the tone of the capillary circulation in various organs, and consequently their functional activity; above all, that this power is peculiarly manifested with reference to the liver; and they adduce numerous examples to establish the correctness of their opinions. On the other hand, several eminent authorities deny the correctness of the theories and positions of these advocates, and affirm that their experience and experiments, as well as all sound therapeutical theories, are decisive against the opinion that calomel possesses the peculiar virtues which are claimed for it. If this remedy be used, it should be in minute and frequently repeated doses— $\frac{1}{2}$ to $\frac{1}{4}$ of a grain every 2 hours; and sometimes oftener— $\frac{1}{16}$ to $\frac{1}{8}$ of a grain every hour. It should always be combined with sufficient opium in some form to allay the griping and other pain, and arrest the straining. Alkaline carbonates should also be given. It is recommended by many authorities that when a laxative is given in the commencement of the treatment, a saline, as sulphate of magnesia or Rochelle salts, should be preferred. Hygienic measures are of the greatest importance. The strictest attention should be paid to cleanliness and ventilation. Pure, fresh air is necessary, not only as a tonic to the nervous system, but as one of nature's principal means of eliminating effete and poisonous matter. Counter-irritants in the form of sinapisms, made weak and continued, are frequently of great advantage in aiding to restore the capillary circulation in the diseased parts, by arousing a reflex influence in the nervous system. The diet is of no secondary importance, and should be bland and nutritious. Eggs, raw or very slightly boiled, mixed with Catawba or sherry wine, or brandy; rice water, as a beverage, combined or alternated with beef-tea, will often afford nourishment not easily supplied in other ways. Rare beefsteak, if chewed and the juice swallowed, often affords a good form of food; toast and tea also may be taken. Tea for the sick-room should always be of the most delicious kind, and freshly prepared, and *weak*. Pure water, actively boiling, should be poured upon a proper quantity of tea in an earthen vessel, and allowed to stand not more than two or three minutes before being turned off, as the continued presence of the leaves allows of the absorption of too much tannin and other extractive matter, by which the fragrance and best qualities of the beverage are injured.

DYSLYSINE is an organic substance ($C_{48}H_{36}O_6$) obtained by boiling cholidic acid with hydrochloric acid for some time. It is a neutral resinous body, which is difficultly soluble in naphtha, turpentine, and other common solvents.

DY SODIL, a yellow or grayish laminated bituminous mineral, often found with lignite. It burns vividly, and diffuses an odor of asafetida.

DYSPEPSIA (Gr. *dys*, difficult, and *pepsis*, digestion), a scientific term for indigestion (q.v.).

DYSPHONIA, signifying primarily difficult speaking, of which the most common example is the disease popularly known as "clergyman's sore-throat." It is attended with inflammation, huskiness, coughing, expectorating, and sometimes ulceration. Rest of the vocal organs, muscular exercise, tonics, and change of air and scene, are helpful towards recovery. It is a recent theory that, with preachers, this trouble arises from the forcible use of the voice only one day in seven, after six days of quietness—the injury arising not from the use, but from the sudden and violent change involved in the use; thus indicating as a remedy or preventive such daily vocal exercise as shall avoid a sudden strain on any one day.

DYSPNŒA (Gr. *dys*, difficult, and *pnœa*, breathing), a word the meaning of which is sufficiently indicated by its etymology. See **ASTHMA**; **RESPIRATION**, **ORGANS AND PROCESS OF**.

DYSURIA (Gr. *dys*, difficult, and *ouros*, urine), a difficulty of passing urine. It may depend on a variety of causes, as regards which, see **BLADDER**; and **URETHRA**.

DYTISCUS (Gr. *dytes*, a diver), a Linnæan genus of aquatic coleopterous insects or water-beetles, now forming the tribe or family *dytiscidæ*. They are *pentamerous* coleoptera; that is, have all the *tarsi* five-jointed. Their general form is oval, the outline little broken, and the surface very smooth. The respiratory organs of the perfect insect are not adapted to the extraction of air from water, and it must occasionally come to the surface to breathe, where it rests for a short time back downward, and with the extremity of the abdomen exposed to the air, the openings of the air-tubes being in the last

segment. The *dytiscidæ* are excessively voracious, feeding upon any kind of animal food, and boldly attacking creatures larger than themselves. They are very amusing inmates of the fresh-water aquarium, and sometimes live in it for a year or two, getting tame, and readily coming to be fed with small earth-worms, bits of beef, etc. The species are numerous, and vary much in size, some being very small, and some almost 2 in. in length. A very common British species is *D. marginalis*, about an inch and a quarter in length, of a dark olive color, the thorax and outer sides of the elytra margined with yellow. All the species are found in lakes, ditches, marshes, and the still parts of rivers. They often leave the water by night, and can fly well. Their larvæ have the body long and tapering, composed of eleven rings or segments, besides the head. They hide themselves in the earth, in chambers which they make for themselves, before changing into pupæ.

DY VEKÉ (i. e., *dove*), called by the Latin chroniclers Columbula, the mistress of Christian II. of Denmark, has been often celebrated in works of poetry and fiction. She was born in Amsterdam in 1488, and Christian became acquainted with her in 1507, in Bergen, where her mother, Sigbrit Wylms, had settled as an innkeeper. She followed him to Opslow, and, when he mounted the throne, to Copenhagen. Notwithstanding the marriage of Christian with Isabella, the sister of the emperor Charles V., his relation with D. was continued, and her mother acquired unbounded influence in the affairs of the country. Though D. herself never interfered, she was naturally hated by the party of the nobles; and her death, which happened suddenly in 1516, was attributed, with almost certainty, to poison. The poison was understood to have been administered to her in cherries by the noble and proud relations of the governor of the palace, Torben Oxe, who was a suitor for the affections of Dyveké. On her death, the character of Christian broke out in all its savageness. He first ordered the treasurer Faaburg to be executed for having said that Torben Oxe had enjoyed the favor of D.; and then at the instigation, as was given out, of a nightly vision, Torben Oxe himself. Samsøe, a Danish poet, wrote, about the end of the 18th c., a tragedy called *Dyveké*, often represented in Copenhagen. The story has since been made the subject of several novels and tragedies; e. g., *Wilhelm Zabern*, by J. C. Hauch, a Dane; and Riekhoff's tragedy, *Dyveke* (Berl. 1843).

DYVOUR AND **DYVOUR'S HABIT** (from the Fr. *devoir*, to owe; a debtor). In the old legal language of Scotland, a D. seems to have been synonymous with a bankrupt. Skene speaks of a D. or "bairman" (bare-man), as one who, "being involved and drowned in debts, and not able to pay or satisfy the same, for eschewing of prison and other pains, makes cession and assignation of all his goods and gear in favor of his creditors, and dons his devoir and duty to them, proclaiming himself bairman and indigent, and becoming debt-bound to them of all he has." It was ordained by act of sederunt of 17th May, 1606, that a pillory be erected near the market cross of Edinburgh, with a seat upon it, upon which dyvours shall be exposed once on a market day; and before their liberation from jail, they are required to provide themselves with a hat or bonnet of yellow color, to be worn by them while thus exposed, and constantly thereafter, while they continue dyvours, under pain of three months' imprisonment if they be found without it. By subsequent acts (26th Feb., 1699, and 23d Jan., 1673), the dyvour's habit is appointed to be a coat or upper garment, half yellow and half brown, with a party-colored cap or hood, to be worn on the head; any of his creditors being entitled to imprison him if he be found without it. The act of sederunt of 18th July, 1688, prescribes as the dyvour's habit, "a bonnet, partly of a brown and partly of a yellow color, with uppermost hose, or stockings, on his legs, half brown and half yellow colored, conform to a pattern delivered to the magistrates of Edinburgh, to be kept in their tolbooth;" and declares that the lords will not hereafter dispense with it, unless in the case of innocent misfortunes. Finally, by statute (1696 c. 5), the lords of session are prohibited from dispensing with the dyvour's habit unless, in the process of cessio bonorum (q. v.), the bankrupt's failure be alleged and proved to have been by misfortune. This statute is repealed, and the dyvour's habit abolished, by 6 and 7 Will. IV. c. 56—previous to which time the barbaric practice of wearing the habit had, by sufferance of the court, been departed from.

DZE'REN. See ANTELOPE.

DZIG'GETHAI, **DJIGGETAI**, **KIANG**, **KHUR**, or **GOOR**, *Equus hemionus*, a quadruped nearly allied to the ass, and believed to be the *hemionus* of Herodotus and Pliny. See ASS. It inhabits the elevated steppes of Tartary, extending into the s. of Siberia and to the borders of India. In appearance and characters, it is intermediate between the horse and the ass, whence the ancient Greek name *hemionus* (half-ass). In size it approaches the horse, which it resembles also in gracefulness of action, and in its neighing, which is even more deep and sonorous. Its general shape is much like that of a mule. The D. lives in small herds, sometimes of several males and several females, sometimes of a single male with about twenty females and foals. It is an animal of great fleetness and shyness, or watchfulness, and possesses also great powers of endurance in flight, so that it is with difficulty killed by the hunter. The Mongols and Tungûs, however, hunt it very eagerly on account of its flesh. It has been domesticated

and reduced to the service of man, but there does not seem to be any evidence of its ever breeding in a state of domestication.

DZUNGARIA, or **SONGARIA**, a former Mongolian kingdom of central Asia, destroyed by the Chinese invasion about 1757-59. It included most of that part of central Asia, extending from 35° to 50° n., and from 72° to 97° east. A part of this territory now belongs to China, and part to Russia.

E

E, **THE** fifth letter in the Greco-Roman alphabets. Its original and fundamental sound is that heard in *Eng. tent*. The sound heard in *me* is not given to it in any language but English. In the series of vowels it stands intermediate between *i* and *a*. See **LETTERS AND ARTICULATE SOUNDS**, where the various vowel-sounds represented by the character *e* in English will be noticed.

E, in music, is the third note or sound of the natural diatonic scale, and is a third above the tonic C, to which it stands in proportion as 5 to 4. As a major third, that is, when the tonic C vibrates 4 times, the E above vibrates 5 times. E is the third harmonic which arises naturally from C as a fundamental note. E major, as a key, has four sharps at its signature, viz., F, C, G, and D sharp. E minor, as a key, has only one sharp, F, same as G major, of which E is the relative minor.

EACHARD, JOHN, D.D., 1636-97; an English divine, educated at Cambridge, where he became master of Catherine hall. He was a doctor of divinity, and for two terms vice-chancellor of the university. He published a number of half-satirical attacks upon the clergy, among them *The Ground and Occasions of the Contempt of the Clergy inquired into, in a Letter to R. L.*; and, in answer to attacks upon this work, he issued *Some Observations, etc., in a Second Letter to R. L.* He attributed the contempt into which the clergy had fallen to their imperfect education, their insufficient incomes, and the want of a true vocation, giving amusing illustrations of the poverty and absurdity of the pulpit oratory of the day. In a similar vein of satire, he attacked the philosophy of Hobbes. Swift called him a successful humorist who failed as a serious writer.

EADIE, JOHN, D.D., LL.D., 1810-76; b. Scotland; educated at Glasgow university, and in 1835, ordained minister of the Cambridge street Secession church in Glasgow. In this position he took part in the union, in 1847, of his denomination with the Relief church, under the name of the United Presbyterian church. He became the leading representative of the latter denomination. Most of his written works were in connection with biblical criticism and interpretation. Among them were a *Biblical Cyclopædia*; an *Analytical Concordance*; *Early Oriental History*; *Life of Dr. Kitto*; and *History of the English Bible* (1876). See *Life*, by James Brown (1878).

EADMER OF CANTERBURY, a man of considerable mark in the beginning of the 12th c., would seem, from his name, to have been the child of English parents. At an early age, he entered the Benedictine monastery of Canterbury; and when St. Anselm, in 1093, was made archbishop of that see, Eadmer became one of his most devoted friends, sharing his exile, watching his death-bed, ordering his burial, and writing the chronicle of his life. Eadmer continued at Canterbury, in high esteem with St. Anselm's successor, archbishop Ralph, until 1120, when, at the request of king Alexander I., he went to Scotland, and was there chosen bishop of St. Andrews. The question of lay investiture of ecclesiastical benefices was then in its crisis; there was a controversy between Canterbury and York for jurisdiction over the see of St. Andrews; that see, again, asserted its independence of either of the English metropolitans; and Eadmer seems to have added to all these perplexities a difficulty as to his monastic allegiance. "Not for all Scotland," he said to the Scottish king, "will I renounce being a monk of Canterbury." The king, on his side, was equally unyielding; and the issue was the return of Eadmer to his English monastery, unconsecrated, indeed, but still claiming to be bishop of St. Andrews. He was made precentor of Canterbury, and died, it is supposed, in Jan., 1124. He tells us that, from his childhood, he was a diligent observer of contemporary events, especially in church affairs; and this habit has given more than usual interest to his writings. The most valuable are his *Historia Novorum*, or history of his own times, first printed by Selden in 1623, and his *Vita Anselmi*, or Life of St. Anselm, first published at Antwerp in 1551. Both these works are included in the selection of his writings published by the Benedictines of St. Maur (as a supplement to their edition of the works of St. Anselm), in 1 vol. fol. (Paris, 1721). His lives of St. Odo, St. Dunstan, and St. Bregwyn, of Canterbury, and of St. Wilfrid and St. Oswald, of York, were printed, some of them, by Wharton, in the second part of his *Anglia Sacra* (Lond. 1691), and others by Gerberon in his *Anselmi Opera* (Paris, 1675). The history of Eadmer, in relation to the bishopric of St. Andrews, is given at considerable length by lord Hailes, in his *Annals of Scotland*, vol. i. pp. 59-71; and, still better, in Mr. Grub's *Ecclesiastical History of Scotland*, vol. i. pp. 209-217 (Edin. 1861).

EADS, JAMES BUCHANAN, b. Ind., 1820: removed to St. Louis and became clerk on a Mississippi steamer; went into the business of recovering sunken boats and cargoes, in which he made a fortune. When the civil war began, he offered plans for the defense of the western rivers, and undertook the construction of iron-clad gun-boats. In 1862, he built six iron-proof propellers, having two turrets each, in which he tried many of his own inventions. He was the constructor of the St. Louis bridge, of the important works for deepening the channel at the mouth of the Mississippi (see **JETTY**), and formed a company, 1887, to construct a canal across the isthmus of Tehuantepec. He d. 1887.

EAGLE, a w. central co. of Col., formed 1883 from part of Summit co.; 1600 sq.m.; pop. '90, 3725. It is very mountainous in the e., contains the celebrated mountain of the Holy Cross, and is watered by Grand and Eagle rivers. Co. seat, Red Cliff.

EAGLE (*aquila*), a genus of birds of prey, by some naturalists subdivided into several genera, constituting a group which contains the largest and most powerful of the *falconidae*. From the most ancient times, the E. has been universally regarded as the emblem of might and courage; and, like the lion, it has been fancifully invested with other attributes of greatness, such as men thought to harmonize with these. Its extraordinary powers of vision, the vast height to which it soars in the sky, the wild grandeur of the scenery amidst which it chiefly loves to make its abode, and perhaps also its longevity, have concurred to recommend it to poetic regard. It was associated with Jupiter in the Roman mythology; its figure on the standards of the Roman legions expressed and animated their confidence of victory.

The eagles have the beak not curved from the very base, like the true falcons, nor notched on the edge, neither are their wings so long in proportion to their size. Their wings are, however, very broad and expansive; their legs are very robust; their claws curved, sharp, and strong. In the most restricted use of the generic term, the true eagles, of which the golden E. may be taken as a type, have a rather short bill, curved from the cere, with a slight festoon on the edge of the upper mandible, the tarsi are short, and feathered down to the toes. This last character distinguishes them at once from the *ernes* (q.v.), often also called eagles. There are several species of true eagles well ascertained, although in this as in allied genera much confusion has arisen from the diversity of plumage at different ages.—The **GOLDEN E.** (*A. chrysaetos*)—of which what is called the ring-tailed E. is the young—is about 3 ft. or 3 ft. and a half in length, and 8 ft. in spread of wing. The female is rather larger than the male; the color is dark brown, in some parts almost black, the head and back of the neck in mature birds covered with pointed feathers of a golden-red color; young birds have a considerable part of the tail white. The golden E. is the largest of the European eagles, and is found not only throughout Europe, preferring wild and mountainous situations, but throughout almost the whole northern hemisphere: it is amongst the birds of India, of the n. of Africa, and of North America; and the savage warrior of the Rocky mountains, “as well as the Highland chieftain, glories in his E. plume.” Although occasionally seen in all parts of Britain, it builds its nest only in mountainous districts, carrying a few sticks and brambles to the inaccessible shelf of a rocky precipice, where the eggs are deposited almost on the bare rock. The golden E. is now rare even in the Highlands of Scotland. A great quantity of prey is necessary to support a pair of these birds and their two or three young ones; and not only hares, game of every kind, and lambs are carried to the eyrie, but larger animals are sometimes attacked, and almost every district where eagles build their nests has its stories of children carried off to feed the eaglets, and often of their almost miraculous preservation.—The next in size to the golden E. among the eagles of Europe is the imperial or Grecian E. (*A. imperialis*), but it is more common in Egypt than in Europe, and has never been seen in Britain.—The spotted E. (*A. naevia*) has occurred in the s. of Ireland.—There is an Australian E. (*A. fuscus*).

Eagles were ranked among what were called, in the language of falconry, ignoble birds of prey, as incapable of being tamed and employed to assist in the sports of man. But either the golden E. or the imperial E. is used by the Tartars in the chase of antelopes, wolves, foxes, hares, etc.

The white-tailed E. or cinereous E. of Britain is the common *erne* (q.v.). The white-headed E. or bald-headed E. of America—the chosen emblematic E. of the United States—is also an *erne*. What particular species was the emblematic E. of the ancients, is not more certain than what is the original emblematic Scotch thistle.—Others of the *U.* group of *falconidae* are known as marsh eagles, harpy eagles, eagle-hawks, ospreys, etc., some of which will be noticed in their places.

EAGLE, the king of birds, is used heraldically as an emblem of magnanimity and fortitude.

EAGLE, as a military standard, was adopted by the Romans, and even by nations preceding them in history. The Persians in the time of Cyrus the younger, bore an E. on a spear as a standard. The Romans for some time used the E., the wolf, the boar, the horse, and the minotaur for standards, but afterwards abandoned the last four, and confined themselves to the first. The Roman E., sometimes of gold, but more frequently of silver, was about as large as a pigeon with extended wings, and was borne on the top of a spear, with a cross-bar or a shield to support it. Some of the eagles were represented as holding thunderbolts in their talons, and usually bore the name of

the legion to which each respectively belonged. The E. was sometimes made of steel, but rarely.

In modern times France, Russia, Prussia, Austria, and the United States of America, have all adopted the E. as a national military symbol. The Austrian E. is represented double-headed.

EAGLE, a gold coin of the United States of America, of the value of ten dollars. See DOLLAR.

EAGLE, BLACK, ORDER OF THE, in Prussia, was founded by the elector of Brandenburg, on 17th Jan., 1701, the day of his coronation as king of Prussia. The number of knights, in addition to the princes of the royal family, was originally 30, but it is now unlimited. They must at their nomination be at least 30 years of age. They must prove their noble descent for four generations through both parents. A chapter is held twice a year.

The insignia of the order consist of an octagonal cross of blue enamel, and a black eagle, displayed between each of the arms of the cross. The cross is suspended by a broad ribbon of orange color across the left shoulder, and it is accompanied by an embroidered silver star, fastened on the left breast. The center of the star represents a black flying eagle, holding in one claw a laurel wreath, and in the other a thunder-bolt, with the legend, *Suum cuique*. Fifty ducats must be paid by every new member for the support of the orphan asylum at Königsberg, and he then receives gratis the costume and insignia of the order, of which a full description will be found in Burke's *Orders of Knighthood*, p. 199. As the black eagle is the highest order in Prussia, no member of it, with the exception of foreign princes and knights of St. John, is permitted to wear any other order along with it; and as it is generally granted only to those who are expected to be about the person of the king, no one who holds it is permitted to travel from the court more than 20 German miles without giving notice. Knights of the Black Eagle are likewise knights of the Red Eagle, first class. See next article.

EAGLE, RED, ORDER OF THE, in Prussia, founded in 1734 by the markgraf George Frederick Charles, as a reorganization of the "Ordre de la Sincérité," which had been instituted in the beginning of the century by the hereditary prince of Anspach and Baireuth. After passing through various modifications, the order of the red eagle was raised in 1791 by Frederick William II. to the rank of the second order in the monarchy, and it was then that the decoration of a white enameled Maltese cross, surmounted by a royal crown, with the Brandenburg eagle in the corner, was adopted. All the knights of the Black Eagle were received into this new order; and it was latterly decreed that only those who had been decorated with the red eagle, in the first instance, could be received into the black. In 1810, the order of the Red Eagle was reorganized, and two more classes were added to it. In 1830, the second class was subdivided into two, one of which only was allowed to wear a square star.

EAGLE HAWK, *Morphnus* or *Spizaetus*, a genus or sub-genus of *falconidæ*, of the eagle group, but consisting of species of comparatively small size, and characterized by short wings, long slender legs (*tarsi*), and comparatively feeble toes and claws. Some of the species are extremely beautiful in form and colors. They are natives of warm climates, chiefly of South America, but also of Africa and the East Indies. The crested eagle (*M. cristatus*) of Guiana, and the Brazilian eagle, or urubitinga (*M. urubitinga*), may be mentioned as examples. The latter, although not so large as a goose, is sometimes called the Brazilian eagle.

EAGLE OWL, *Bubo*, a genus of the owl (q.v.) family (*strigidæ*), characterized by a somewhat incomplete facial disk, two tufts of feathers (*horns* or *egrets*) of considerable size on the head, ears with small openings (*conchs*), legs and toes covered with feathers, short strong curved bill, and long curved sharp claws. To this genus belong the largest of the nocturnal birds of prey. The E. O. of Europe (*B. maximus*) is little inferior in size to the golden eagle, and preys on quadrupeds such as hares, rabbits, and young deer, and on grouse, partridges, and other kinds of game. It seizes its prey with its feet, and seldom touches it with the bill till its struggles are over. It is an inhabitant of many parts of Europe and Asia, but it is only a rare occasional visitor in Britain. The loud peculiar cry of this bird, resounding strangely through the night, has obtained for it its German name of *uhu*, and an intimate association from time immemorial with evil omens and superstitious terrors.—The E. O. of America (*B. Virginianus*), the VIRGINIAN HORNED OWL or GREAT HORNED OWL, is very similar to the species just noticed, but of inferior size, although still a large and powerful, as it is also a bold bird. It does not scruple to attack half-grown turkeys, and often succeeds in making them its prey. It carries off with ease almost any other inhabitant of the poultry-yard. It is found in almost all parts of America.

EAGLE WOOD, an East India tree of which there are three varieties, containing much resin, and an oil which the natives esteem highly as a perfume or incense. Some of the trees are naturally inodorous, but after a disease which often attacks them the wood becomes colored and gives out a powerful scent. It is supposed to be a cure for gout, and in Europe is sometimes prescribed for rheumatic affections.

EA GRE, another name for the bore (q.v.) in tidal rivers.

EAR, THE, ANATOMY AND PHYSIOLOGY OF. The apparatus of hearing, as it exists in man and the mammalia, is composed of three parts—the external ear, the middle ear or tympanum, and the internal ear or labyrinth.

The *external ear* consists of two portions, the *auricle* or *pinna* (the part popularly recognized as the ear), and the *auditory canal* or *external meatus*.

The *auricle*, on its outer or more exposed surface, presents various eminences and depressions, resulting from the form of its cartilaginous frame-work. These have received special anatomical names, to which it is unnecessary to advert further than to mention that the deep capacious central space to which several grooves converge, is termed the *concha*, and that the lowest and pendulous portion of the ear is termed the *lobe*. The cartilage forming the basin of the external ear consists of one principal piece, in which there are several fissures, which are filled up by fibrous membrane. Several muscles are described as passing from one part of the auricle to another, but they are so little developed in man that they do not require notice; there are additionally three muscles—the *attollens aurem* (or *superior auris*), the *attrahens aurem* (or *anterior auris*), and the *retrahens aurem* (or *posterior auris*), which pass from adjacent parts of the scalp to the E., and which, though more developed than the previous group, are of little or no real importance in man (at least in his civilized state), but are of considerable use in many mammals. Their actions are sufficiently indicated by their names.

The auditory canal passes from the *concha* inwards, and a little forwards, for rather more than an inch. It is narrower at the middle than at either extremity; and on this account there is often considerable difficulty in extracting foreign bodies that have been inserted into it. The membrane of the tympanum which terminates it is placed obliquely, in consequence of the lower surface of the meatus being longer than the upper. The canal is partly cartilaginous and partly osseous; the osseous portion consisting in the fœtus of a ring of bone, across which the membrane is stretched, and in many animals remaining persistently as a separate bone. The orifice of the meatus is concealed by a pointed process, which projects from the facial direction over it like a valve, and which is called the *tragus*, probably from being sometimes covered with bristly hair like that of a goat (*tragos*); and it is further defended by an abundance of ceruminous glands, which furnish an adhesive, yellow, and bitter secretion (see CERUMEN), which entangles small insects, particles of dust, and other small foreign bodies, and prevents their further passage into the meatus.

The *middle ear*, or *cavity of the tympanum*, is a space filled with air which is received from the pharynx (q.v.) through the Eustachian tube, and traversed by a chain of very small movable bones, which connect the membrane of the tympanum with the internal ear. It lies, as its name implies, between the external meatus and the labyrinth or internal E., and opens posteriorly into the cells contained in the mastoid portion of the temporal bone, which are also filled with air, and anteriorly into the Eustachian tube. The cavity is of an irregular shape, and is lined by a very delicate ciliated epithelium, which is a prolongation of that of the pharynx through the Eustachian tube.

Its external wall is mainly formed by the membrane of the tympanum, which is nearly oval, and placed in a direction slanting inwards, so as to form an angle of about 45° with the floor of the auditory canal. The handle of the malleus (or hammer), the first of the chain of ossicles, is firmly attached to the inner side of this membrane in a vertical direction as far downwards as the center, and by drawing it inwards, renders its external surface concave.

Its internal wall has two openings communicating with the internal E., each of which is closed by a delicate membrane. These openings are termed, from their respective shapes, the *fenestra ovalis*, and the *fenestra rotunda*; the former leads to the vestibule, and is connected by its membrane with the base of the stapes (or stirrup-bone), the last of the chain of ossicles; while the latter opens into the cochlea.

The ossicles of the tympanum are three—viz., the *malleus*, the *incus* (or anvil), and the *stapes*. We have already explained how the malleus is connected with the membrane of the tympanum by means of its handle. Through this connection, the tension of that membrane may be modified by the agency of one or two muscles which are attached to this ossicle. These muscles are the *laxator tympani*, which arises from the spinous process of the sphenoid bone (q.v.), and is inserted into the *processus gracilis*; and the *tensor tympani*, which arises from the under surface of the petrous portion of the temporal bone, and is inserted into the handle of the malleus immediately below the commencement of the *processus gracilis*. The existence of the former of these muscles is doubtful, many anatomists regarding the structure in question as ligamentous rather than muscular. The *incus* much more closely resembles a molar tooth with two fangs, than the anvil from which it derives its name. Of the two processes which it gives off, the short one runs backwards, and projects into the mastoid cells behind the tympanic cavity; while the long one inclines downwards, and terminates in the lenticular or orbicular process, to which the head of the stapes is attached. It has a head, neck, two branches, and a base, which, as has been already mentioned, fits into the *fenestra ovalis*. A minute muscle, the *stapedius*, takes its origin from a hollow conical eminence termed the *pyramid*, which lies behind the *fenestra ovalis*, and is inserted into the neck of the

stapes; by pulling the neck backwards, it probably compresses the contents of the vestibule.

The Eustachian tube, into which the tympanic cavity opens anteriorly, is about an inch and a half in length, and passes downwards, forwards, and inwards to its opening in the pharynx. It is partly bony, but chiefly cartilaginous. Its use is to allow the free passage of air in and out of the tympanum, and to admit of the egress of the mucus secreted in that cavity.

The *internal ear* or *labyrinth* is the essential part of the organ of hearing, being the portion to which the ultimate filaments of the auditory nerve (q.v.) are distributed. It is composed of three parts—viz., the *vestibule*, the *semicircular canals*, and the *cochlea*, which form a series of cavities presenting a very complicated arrangement, and lying imbedded in the hardest part of the petrous portion of the temporal bone. They communicate externally with the tympanum by the two openings already described—the *fenestra ovalis*, and the *fenestra rotunda*; and internally with the internal auditory canal, which conveys the auditory nerve from the cranial cavity to the internal ear. The very dense bone immediately bounding these cavities is termed the *osseous labyrinth*, to distinguish it from the *membranous labyrinth*, which lies within a portion of it.

The *vestibule* is a common central cavity into which the semicircular canals and the cochlea open. It is about a fifth of an inch in height, and in length from before backwards its transverse diameter (from side to side) being somewhat less. On its posterior wall are five orifices for the semicircular canals, one of the orifices being common to two of the canals. Anteriorly, the cochlea enters it by a single opening, the beginning of the *scala vestibuli*. On its outer wall is the *fenestra ovalis*, and on its inner are the *fovea hemispherica*, containing several minute orifices for the entrance of filaments of the auditory nerve, and the *fovea semi-elliptica*.

The *semicircular canals* are three in number, and open at both ends into the vestibule. They vary in length, and notwithstanding their name, each is considerably more than a semicircle, the superior vertical canal being the longest. Their average diameter is about a twentieth of an inch, the extremity of each canal exhibiting a dilatation or *ampulla*. Each canal lies in a different plane, very nearly at right angles to the planes of the other two, hence their names of the *superior vertical*, the *inferior vertical*, and the *horizontal* canals.

The *cochlea*, which derives its name from its resemblance to a common snail-shell, forms the anterior portion of the labyrinth. It consists of an osseous and gradually tapering canal, about an inch and a half in length, which makes two turns and a half spirally around a central axis, termed the *modiolus*, which is perforated at its base for the entrance of the filaments of the cochlear portion of the auditory nerve. This spiral canal gradually diminishes towards the apex of the cochlea. At its base, it presents two openings, one into the vestibule, and the other (closed by a membrane, and communicating with the tympanum) being the *fenestra rotunda* already described. Its interior is subdivided into two passages (*scalæ*) by an osseo-membranous lamina. This is the *lamina spiralis*, which divides the cochlea into an upper passage, the *scala vestibuli*, and a lower one, the *scala tympani*. At the apex, these two passages communicate by an opening to which the term *helicotrema* has been applied. Between the two *scalæ*, there is a third space termed the *ductus cochlearis*, or *scala intermedia*. In this space the filaments of the auditory nerve terminate, by being connected with a complicated arrangement of peculiarly formed epithelial cells, constituting the organ of corbi. For a notice of the membranous portion of the *lamina spiralis*, see AUDITORY NERVE.

We now return to the *membranous labyrinth*. The membranous and osseous labyrinths have the same shape, but the former is considerably smaller than the latter, a fluid, termed the *perilymph*, intervening in some quantity between them. At certain points, recent investigations have shown that the membranous is firmly adherent to the inner surface of the osseous labyrinth. The vestibular portion consists of two sacs, an upper and larger one, of an oval shape, termed the *utricle*, or *common sinus*, and a lower and smaller one of a more globulous shape, called the *sacculus*.

The membranous semicircular canals resemble in form and arrangement the osseous canals which inclose them, but are only one third of the diameter of the latter. The ultimate filaments of the auditory nerve (q.v.) mainly go to the utricle, to the sacculus, and to the ampulla of the canals.

The membranous labyrinth is filled by a fluid which is termed the *endolymph*; and in certain spots, especially at the terminations of the vestibular nerves, we observe, both in man and the lower animals, calcareous matter either in a powdered or solid form. In man and mammals generally, and in birds and reptiles, it occurs as a powder, and is termed *otoconia* or *ear-powder*, and it always consists of carbonate of lime.

We now proceed to consider the different functions or offices of the various parts of the organs of hearing.

1. *Of the External Ear.*—A true auricle only exists in the mammalia, and in this class it varies from little more than an irregularly-shaped cartilaginous disk, with little or no motion, as in man and the quadrumana, to an elongated funnel-shaped ear-trumpet, movable in all directions by numerous large muscles, as in the horse, the ass, and the bat.

The mode in which we see it employed by those animals in which it is highly

developed, sufficiently indicates that its main function is to collect and concentrate the sounds which fall upon it. But the experimental investigations of Savart, with an apparatus constructed to resemble the tympanic membrane and the external auditory apparatus, show that these parts are also adapted to enter into vibrations in unison with those of the air; and he suggested that the human auricle, by the various directions of different parts of its surface, could always present to the air a certain number of parts whose direction is at right angles with that of the molecular movement of that fluid, and therefore is the most favorable position for entering into vibrations with it.

2. *Of the Tympanum and its Contents.*—Savart's experiments show that the membrane of the tympanum is thrown into vibration by the air, and that it always executes vibrations equal in number to those of the sonorous body which excites the oscillations in the air. He further ascertained that the malleus participates in the oscillations of the tympanic membrane, and that these vibrations are propagated to the incus and stapes, and thus to the membrane of the fenestra ovalis. The malleus has further the office of regulating, through the *tensor tympani* muscle, the tension of the tympanic membrane; and to allow of the motion necessary for this purpose, we find movable joints between it and the incus, and again between the latter bone and the stapes. The contraction of the stapedius muscle similarly modifies the tension of the membrane of the *fenestra ovalis*; and as compression exercised on this membrane extends to the perilymph, and is propagated through it to the *fenestra rotunda*, the tension of the membrane of the latter opening is also influenced by the muscle in question. The incus is much more limited in its motions than either of the other bones, and its use seems to be to complete the chain of ossicles in such a manner as to prevent any sudden or violent tension of the membranes, such as we can easily conceive might occur, if the conductor between the membranes were a single bone. The presence of air in the tympanic cavity serves a double purpose: in the first place, it preserves a uniform temperature on the outer surfaces of the fenestral membranes, and thus supports a fixed elasticity in them, which would not be the case if they were freely exposed to ordinary atmospheric changes; and secondly, the action of the chain of ossicles as conductors of sound is materially increased by their being completely surrounded by air, as is obvious from the first principles of acoustics.

3. *Of the Labyrinth.*—Sound is conducted to the labyrinth in three ways: first, by the chain of bones; secondly, by the air in the tympanic cavity; and thirdly, through the bones of the head.

Müller has shown, by very ingenious experiments on an apparatus constructed to resemble, on a large scale, the middle and internal E., that while the air in the tympanum conducts sound to the cochlea, through the *fenestra rotunda*, the chain of bones forms a much better conductor of it to the vestibule, through the *fenestra ovalis* (see the chapter on hearing in his *Physiology*). Hence, we infer that the vestibule is adapted to receive sounds from the membrane of the tympanum and the external E., while the cochlea, on the other hand, as its structure and connections indicate, may be regarded as that part of the labyrinth which is specially affected by sounds communicated through the bones of the head.

That the vestibule is the essential or fundamental part of the organ of hearing, is sufficiently proved by its constancy, other parts gradually disappearing as we descend the animal scale, and by its central position in the ears of the higher animals. The use of the otoconia or ear-powder is to strengthen the sonorous undulations, and to communicate to the membranous vestibule and ampullæ, and to their nerves, stronger impulses than the perilymph alone could impart. The action of otoliths or ear-stones, such as occur in osseous fishes, must be still more decided, and is well illustrated by the following experiment of Camper: Fill a bladder with water, and place a pebble in it. The slightest impulse communicated to the bladder disturbs the pebble, which consequently produces a greater impression on the hand supporting the bladder than the water alone could do.

Nothing certain is known regarding the functions of the semicircular canals, but their constant existence and number* in the vertebrate animals indicate their importance; and in most cases of congenital deafness they are more or less defective. The fact of their position corresponding with the three dimensions of a cube—namely, its length, breadth, and height—has led to the opinion that they are concerned in conveying a knowledge of the direction of sounds. This view is supported by prof. Wheatstone, who believes that we distinguish best the direction of those sounds which are sufficiently intense to affect the bones of the head, and that it is from the vibrations which are transmitted through these bones that our perception of direction is obtained. Thus, if the sound be transmitted in the plane of any one canal, the nervous matter in that canal will be more strongly acted on than in either of the other two; or if it be transmitted in a plane intermediate between the planes of this canal and the adjacent one, the relative intensity with which these two canals will be affected will depend upon, and indicate the direction of the intermediate plane.

The range of hearing, like that of vision, varies remarkably in different persons.

* The only exceptions that we can call to mind are those presented by the myxine or hag and the lamprey—the former has only one, the latter two, semicircular canals. Both are fishes of very low organization.

Some persons are insensible to sounds which others can readily hear. The ordinary range of human hearing comprised between the lowest notes of the organ and the highest known sound emitted by insects includes, according to Wollaston, more than nine octaves, the whole of which are distinctly perceptible by most ears. He relates, however, several cases in which the range, in reference to the perception of high notes, was much less. In one individual, the sense of hearing terminated at a note four octaves above the middle E of the pianoforte, the F above it being inaudible, although his hearing in other respects was as perfect as that of persons in general; another case was that of a lady who could never hear the chirping of the field-cricket; and in a third case the chirping of the common house-sparrow could not be heard. See his memoir on sounds inaudible by certain ears, *Phil. Trans.*, 1820.

The sensation of sound, like that of light, frequently lasts longer than the exciting cause. We have familiar proof of this fact in the noise which remains in the ears after a long journey in a coach or railway; and it was clearly demonstrated by Savart, who found, in his experiments on toothed wheels, that the removal of one tooth did not produce any interruption of the sound.

For diseases of the E., see DEAFNESS.

EAR, DISEASES OF THE. See DEAFNESS and OTITIS.

EAR, in music, is a figurative expression, meaning the possessing of a sensitive, just, and delicate appreciation of sound and measure.

EAR-COCKLES, PURPLES, or PEPPER-CORN, a disease in wheat, owing to the presence of *vibrio tritici*, one of the *infusoria*. This is an animal of worm-like form, yellowish-white, slender, tapering towards the tail, and more suddenly attenuated to a point at the head. Its minute eggs are supposed to be introduced into the sap of the wheat from infected seed, and so to find their way to the flowers, where they are hatched in the germen; the infected grains become dark green, then black, rounded like small pepper-corns, and furrowed on the surface; the glumes spread open, and the awns become twisted; the grains are filled with a white cottony substance, which at once dissolves in water, liberating the *vibrio* in great numbers. Henslow calculates that 50,000 of the young *vibrio* might exist in a grain of wheat. If the wheat is dried, the *vibrio* becomes dormant, but retains its vitality in this state for six or seven years, and is ready to revive on the application of moisture.

EARL (Ang.-Sax. *eorl*—a corruption of *ealdor*). The distinctive name of the noble amongst the northern races was *eorl*, or *jarl*, as opposed to the mere freeman, the *ceorl*, or *karl*; from which latter name come the modern German word *kerl*, and the Scotch word *carl*. From indicating the whole noble class, the title of *eorl* among the Anglo-Saxons, and perhaps generally among the Teutonic nations, came at first probably to be limited to those who were *ealdors*, or *ealdormen*, by office—that is to say, to those who were appointed to be at once governors and judges over a certain district, and to whom, according to Kemble (*Saxons in England*, ii. p. 126), the titles of *dux*, *princeps*, and *comes* are indiscriminately applied by the Latin writers, the same officer being sometimes called by the one title, and sometimes by the other. Being thus limited to those who held the office of *ealdors*, the social not unnaturally came to be confounded with the official title, and hence the general error of tracing the word *earl* not to *eorl*, a noble, but to *ealdorman*, a title which Mr. Kemble prefers to translate by duke. The early relation which subsisted between the duke and the count has been explained under the former title. In Europe generally, it was not till the count came to be recognized as a subordinate officer to the duke, governing a district of the province committed to the latter, that the *earl* assumed the position of the governor of a county, by the name of which he was commonly known. The title of duke, if it had ever existed, early disappeared in England, and was not revived till the time of Edward III. After the Norman conquest, the French term count was substituted for *earl*; but it held its place only for a very short time as the title of the officer, though it has continued ever since to give a name to the district over which he presided, and a title to his wife. William the Conqueror, after the battle of Hastings, recompensed his chief captains by granting to them the lands and offices of the Saxon nobles; but by making the title of *earl* hereditary, he took, unintentionally perhaps, the first step towards changing it from a title of office to a title of dignity, and thus depriving it of substantial power. Deputies, *vice-comites*, or sheriffs, came necessarily to be appointed in all cases in which the *earl* was a minor, or otherwise incapacitated from discharging the duties of the office, till gradually the office itself passed to the deputy; the dignity alone, with the hereditary privilege of sitting as a legislator in the house of lords, remaining with the principal. The form of creation of an *earl* formerly was by the king girding on his sword, and placing his coronet on his head, and his mantle on his shoulders; but *earls* are now created by letters-patent; and it is not unusual for them to depart so far from the old notion of their being territorial officers, as to take as their titles their own names, with the prefix *earl*—e.g., *Earl Grey*, *Earl Spencer*, *Earl Russell*, etc. At present, the number of *earls*, including the peerages of Scotland and Ireland, exceeds 200. See **PEER**.

The **EARL'S CORONET** is a circle of gold, rising at intervals into eight pyramidal points, or spikes, on the tops of which are placed as many pearls, and which alternate with strawberry-leaves. See **CROWN**.

EARLE, PLINY, 1762-1832; b. Mass.; inventor of machinery for making cards (for carding wool), by which he reduced the labor of hours to as many minutes. He was more than usually well informed in science and literature.

EARLE, PLINY, b. Mass., 1809; son of Pliny the inventor; educated at a Quaker school in Providence; licensed to practice as a physician in 1837; in 1840, was resident physician in the insane hospital at Frankford, Penn.; in 1844, physician to the Bloomingdale (N. Y.) insane asylum; after 1849, visited all the important insane asylums in Europe; in 1853, became physician to the New York lunatic asylum. Among his publications are: *Marathon and Other Poems*; *Visit to Thirteen Asylums for the Insane in Europe*; *History, Description, and Statistics of the Bloomingdale Asylum*; *The Curability of Insanity* (1887); and many articles in the *American Journal of Insanity*. He d. in 1892.

EARLE, THOMAS, 1796-1849; b. Mass.; brother of Pliny the physician. When young he settled in Philadelphia, where he became a journalist and lawyer. He was active in the Pennsylvania constitutional convention in 1837, and is credited with having made the original copy of the new constitution. In 1840, the liberty party made him their candidate for vice-president, probably because he had broken away from the democratic party by advocating the extension of the right of suffrage to colored men. He published *Essay on the Penal Law*; *Essay on the Right of States to alter and annul their Charters*; *Treatise on Railroads and Internal Communication*; *Life of Benjamin Lundy*; and a school spelling-book. At the time of his death he was about finishing a history of the French revolution. In early life he edited the *Columbian Observer*; *Standard*; *Pennsylvanian*; and *Mechanics' Free Press and Reform Advocate*.

EARL MARSHAL, an office of great antiquity, and formerly of importance. There seems reason to believe that the marshal of England, afterwards the E. M., was a distinct officer from the marshal of the king's house, but the point is not altogether clear, and there is, consequently, some difficulty in determining which of the offices was held by the Mareschals, earls of Pembroke. For many generations the office has been hereditary in the family of the dukes of Norfolk, though the earls marshal having, to an unusual extent, had the fate to die either childless or without heirs-male, the line of descent has been by no means a direct one. The last grant is by king Charles II., and bears date 19th Oct., 1672. The E. M. presided jointly with the constable over the court of chivalry (q.v.), the last proceedings of which are said to have taken place in 1631. He is the head of the heralds' college (q.v.), which has jurisdiction in descents and pedigrees; determines all rival claims to arms; and he grants armorial bearings, through the medium of the kings-of-arms, to parties not possessed of hereditary arms. The office of the Lyon in Scotland is generally supposed to correspond to that of the E. M. in England, but not quite correctly. The Lyon having been subordinate to the E. M. in England; with this difference, that it extended to the whole kingdom.

EARLOM, RICHARD, an engraver, whose works in mezzotinto, published during the end of last and beginning of this century, are well known as amongst the best of the period when that kind of engraving was practiced without the admixture of etching, was b. in London, in 1743. His works after Reynolds, his plates from pictures in the Houghton gallery, and the *Liber Veritatis*, consisting of imitations of the celebrated drawings by Claude, in the possession of the duke of Devonshire, are standard works in their various departments. He died in 1822, having some time previously retired from his profession.

EARL'S PENNY, an English corruption for Arles penny. See EARNEST.

EARLSTON, or ERCLIDOUNE, a village in the s.w. of Berwickshire, on the Leader, a n. branch of the Tweed, 30 m. w.s.w. of Berwick. Pop. '91, less than 1500. E. has been and still is famed for its manufacture of gingham; it has also a factory for the manufacture of blankets, tweeds, etc. On the left bank of the Leader are the ruins of a building called "Rhymer's tower," as having been the residence of Thomas the Rhymer (q.v.), so famous in Scottish tradition. A mile s. of E. is Cowdenknowes, which is celebrated in song for its "bonny, bonny broom."

EARLY, a co. in s.w. Georgia, on the Alabama border, partially crossed by the Central Georgia railroad; 429 sq. m.; pop. '90, 9792, incl. colored. The surface is level and the soil fertile, producing corn, cotton, etc. The Chattahoochee, on the w. border, is navigable for steamboats. Co. seat, Blakeley.

EARLY, JUBAL ANDERSON, b. Va., 1816; graduated at West Point, 1837; served in the artillery in the Florida war. He resigned in 1838 to study law; became a member of the bar and of the Virginia legislature, and state attorney. In the war with Mexico he served as major and colonel. He was among the first to volunteer in the army of the confederacy, and at Bull Run was in command of a brigade. Two years later, he was brig.-gen., and had command of a division at Gettysburg. In 1864 he made a raid through the valley of the Shenandoah, invaded Pennsylvania, and partially burned Chambersburg. The tide of his success was turned by the union Gen. Sheridan, who defeated him at Opequan, at Fisher's Hill, and at Cedar Creek, and he was routed by

Cluster at Waynesborough. Popular feeling demanding it, he was removed from command in March, 1865. After a trip to Europe, he resumed the practice of law in Richmond. He published *A Memoir of the Last Year of the War for Independence in the Confederate States* (1867). He d. in 1894.

EARLY ENGLISH, the term generally applied to the form of Gothic in which the pointed arch was first employed in Gt. Britain. The early English succeeded the Norman towards the end of the 12th c., and merged into the decorated (q.v.) at the end of the 13th. Its characteristics are beautiful and peculiar. Retaining much of the strength and solidity of the earlier style, it exhibited the graceful forms, without the redundancy of ornament which latterly degenerated into a fault in that which followed. Generally, it may be said to bear to the decorated something like the relation which an expanding rosebud bears to a full-blown rose. The windows are long and narrow, and when gathered into a group, are frequently surmounted by a large arch, which springs from the extreme molding of the window on each side. The space between this arch and the tops of the windows is often pierced with circles, or with trefoils or quatrefoils, which constituted the earliest form of tracery. Each window, however, is generally destitute of any tracery in itself. "The moldings," says Parker, "in general consist of alternate rounds and deeply-cut hollows, with a small admixture of fillets, producing a strong effect of light and shadow."—*Gloss. of Architecture*. Circular windows, however, still continued to be used, and trifoliated archways over doors are also to be found, as at Salisbury cathedral. By far the most characteristic feature of the style is the tooth-ornament (q.v.), which is often used in great profusion. Where foliage is used, it is cut with great boldness, so as to throw deep shadows, and produce a very fine effect. The under-cutting is often so deep as to leave nothing to connect the leaves with the moldings but the stalks, and occasionally the edge or point of a leaf. The term E. E. is said, by Parker, to have been introduced by Mr. Millers in 1805. It corresponds to *Opiciale primitive* of French writers, and is very often known as the first pointed or lancet-arched amongst the English. See GOTHIC ARCHITECTURE.

EARN, a river and loch in the s. of Perthshire, in the finely-wooded, beautiful valley of Strathearn. Loch E. lies to the n. of Ben Voirlich; its eastern extremity is 24 m. w. of Perth. It is 7 m. long from e. to w., 1 m. broad, and 48 fathoms deep, and is surrounded by bold and rugged hills. The river E. flows e. from the loch 40 m. through the strath, past Comrie, Crieff, and bridge of E., into the estuary of the Tay, 7 m. s.e. of Perth. Along the river, near Abernethy, under a thick bed of clay, is a peat-bed 2 or 3 ft. thick, supposed to be a continuation of the submarine forest at Flisk.—The bridge of E., a much frequented village, stands on the right bank of the river, 6 m. s.s.w. of Perth, and near the saline springs of Pitcaithly.

EARNEST, or **ARLES**, as it is called in Scotland, from the civil law word *arrhæ*, is a small sum of money which is given, or a simple ceremony, such as shaking hands, which is performed in proof of the existence of that mutual consent which constitutes a contract. In the first case, the earnest is said to be pecuniary; in the second, symbolical. It is not the E., but the consent, i.e., the agreement to a certain price, that is the root of the bargain; and the E. thus becomes a mere adminicle of evidence, which may be dispensed with even in cases in which it is exacted by custom, if the parties choose to preserve other evidence of the completion of their bargain. The contracts in which E. has been most frequently given both in this country and elsewhere, are sale and service. In the case of sale, it usually consists of a small sum paid by the buyer, by the acceptance of which the seller is held to bind himself to the sale; in the case of service, it is a small sum given by the master, in accepting which the servant becomes bound to serve. The question as to whether the E. shall count as part of the price or wage depends on the intention of the parties, which, in the absence of direct evidence, will be inferred from the proportion which it bears to the whole sum. "If a shilling be given," as Mr. Erskine says, "in the purchase of a ship or of a box of diamonds, it is presumed to be given merely in evidence of the bargain, or, in the common way of speaking, is dead E.; but if the sum be more considerable, it is reckoned up in the price."—*Institutes*, b. iii. tit. iii. s. 5. The original view of E. in England was, that it was a payment of a small portion of the price or wage, in token of the conclusion of the contract (Story on *Sales*, p. 216); and as this view seems to have been adhered to, the sum, however small, would probably there be counted as a part payment. There is only one decision under the 17th section of the statute of frauds (29 Ch. II. c. 3), which provides that "no contract for the sale of any goods, wares, and merchandises, for the price of £10 sterling, or upwards, shall be allowed to be good, except the buyer shall accept part of the goods so sold; and actually receive the same, or give something in E. to bind the bargain, or in part payment." The case referred to "related to the purchase of a horse, where the purchaser produced a shilling from his pocket, and drew it across the hand of the seller's servant, and then returned it to his own pocket; and it was held that this act (which is a custom in the n. of England, and is called striking a bargain) was not sufficient to satisfy the requisitions of the statute."—Story, *ut sup.* From this decision it follows that no importance is attached in England to such fictitious ceremonies as the Jew plucking off his shoe and giving it to his neighbor, the Indian smoking his pipe, or the less poetical observance of thumb-licking, which Erskine tells us was common among the lower classes in Scotland in his day.

EAR-RING. A ring suspended from the ear, which is bored for the purpose. This mode of adorning the person has always enjoyed great favor amongst orientals. By Persians, Babylonians, Lydians, Libyans, and Carthaginians, ear-rings were worn by both sexes. In the classical nations of antiquity, their use was confined to women. In the *Iliad* (xiv. 182, 183), Juno is represented as adorning herself with ear-rings made with three drops resembling mulberries. From this period down to the latest, the practice prevailed in Greece, and we find the ears of the Venus de Medici pierced for the reception of ear-rings. Pliny says (xi. 50) that there was no part of dress on which greater expense was lavished amongst the Romans; and Seneca mentions an ear-ring which he says was worth a patrimony. It has four pearls, two above and two below the precious stone in the center. In the more valuable of the antique ear-rings, pearls were almost always used; and they were valued for the completeness of their form as well as for their whiteness. In place of a ring, the ornament was often attached to the ear with a hook, a custom which still prevails in Italy. Many Egyptian ear-rings of very beautiful design have been preserved. These antique designs have been imitated in modern times, and if the use of an ornament which seems fitter for a South sea islander than an English gentlewoman is to be continued, it can scarcely be made to assume a more graceful form than was often given to it by the ancients. See **RING**. During the reigns of Elizabeth and James I., ear-rings were worn in England by men; a custom which is still continued by many sailors. Master Matthew, in *Every Man in his Humor*, says to Brainworm: "I will pawn this jewel in my ear;" and Hall, in his *Satires* (B. vi. Sat. 1), speaks of the "ringed ear" of the new-come traveler and many similar passages to the like effect might be quoted. At the present day in America, ear-rings are worn only by women. The ears are bored usually at about 7 years of age. The boring, which produces a temporary inflammation, acts as a counter-irritant in cases of sore eyes; and this is sometimes given as a reason for putting rings in the ears.

EARS, a term in organ-building, given to small projecting pieces of metal on the sides of the mouths of metal pipes, put on for the purpose of assisting the pipes to speak promptly, especially when the organ is of small scale. The German name of "beard" is fully more appropriate.

EAR SHELL, *Halkotis*, a marine mollusk, of which the shell is used for inlaying and other ornamental purposes, and for decorating walls. They resemble the human ear in shape; are from 6 to 8 in. long, and 5 or 6 wide; are found in all temperate and tropical seas, and in some countries are used for food, being obtained at low tide in deep water, where they are found adhering to the rocks. There are about 75 living species, and a few fossils have been found.

EARTH, THE, the globe on which we live, being the third planet in order from the sun, and the largest within the belt of the planetoids. We proceed to consider briefly the points of chief interest connected with it, and which do not fall to be treated under separate heads, viz., 1. Its form and magnitude; 2. Its mass and density; 3. Its motions; 4. Its temperature.

1. *The Form and Magnitude of the Earth.*—To a spectator so placed as to have an unobstructed view all round, it appears a circular plain, on whose circumference the vault of heaven seems to rest. Accordingly, in ancient times, even philosophers looked long upon the earth as a flat disk swimming upon the water. But many appearances were soon observed to be at variance with this idea, and even in antiquity, the spherical form of the E. began to be suspected by individuals. It is only by assuming the E. to be spherical, that we can explain how our circle of vision becomes wider as our position is more elevated; and how the tops of towers, mountains, masts of ships, and the like, come first into view as we approach them. There are many other proofs that the E. is a globe. Thus, as we advance from the poles towards the equator, new stars, formerly invisible, come gradually into view; the shadow of the E. upon the moon during an eclipse is always round; the same momentary appearance in the heavens is seen at different hours of the day in different places on the E.'s surface; and lastly, the E., since 1519, has been circumnavigated innumerable times. The objection to this view that readily arises from our unthinking impressions of up and down, which immediately suggest the picture of the inhabitants of the opposite side of the E.—our *antipodes*—with their heads downwards, is easily got over by considering that on all parts of the earth's surface *down* is towards the E.'s center.

It is not, however, strictly true that the E. is a sphere; it is slightly flattened or compressed at two opposite points—the poles—as has been proved by actual measurement of degrees of latitude, and by observations of the pendulum. It is found that a degree of a meridian is not everywhere of the same length (see **DEGREE OF LATITUDE**), as it would be if the E. were a perfect sphere, but increases from the equator to the poles; from which it is rightly inferred that the E. is flattened there. A pendulum, again, of a given length is found to move faster when carried towards the poles, and slower when carried towards the equator, which shows that the force of gravity is less at the equator than at the poles, or, in other words, that the center, the seat of gravity, is more distant at the former than at the latter. The diminished force of gravity at the equator has, it is true, another cause, namely, the centrifugal force arising from the rotation of the E., which acts counter to gravitation, and is necessarily greatest at

the equator, and gradually lessens as we move northwards or southwards, till at the poles it is nothing. But the diminution of the force of gravity at the equator arising from the centrifugal force amounts to only $\frac{1}{289}$ of the whole force; while the diminution indicated by the pendulum is $\frac{1}{157}$. The difference, or $\frac{1}{540}$ nearly, remains assignable to the greater distance of the surface from the center at the equator than at the poles. From the most accurate measurements of degrees that have been made, the flattening or ellipticity of the E. has been determined by Bessel at $\frac{1}{230.155}$, or $\frac{1}{230}$ nearly; or, the equatorial radius is to the polar as 300 to 299. These measurements of degrees determine not only the shape but the size of the earth. Bessel's calculations give a geographical mile, or the 60th part of a mean degree of the meridian, at 951.807 toises (2,029 yards, thus making the whole circumference 43,536,400 yards), and the equatorial and polar diameters at 6,875.6 and 6,855.2 geographical m. (7,925.6 and 7,899.14 English imperial miles). The surface of the E. contains nearly 150 millions of square geographical miles.

2. *The Mass and Density of the Earth.*—We have now seen that the E. is a sphere slightly flattened at its poles—what is called by geometers an elliptical spheroid—of a mean radius of somewhat less than 4,000 miles. We have next to consider its mass and density. Nothing astonishes the young student more than the idea of weighing the E.; but there are several ways of doing it; and unless we could do it, we never could know its density. (1.) The first method is by observing how much the attraction of a mountain deflects a plummet from the vertical line. This being observed, if we can ascertain the actual weight of the mountain, we can calculate that of the earth. In this way, Dr. Maskelyne, in the years 1774–76, by experiments at Schiathallion, in Perthshire, a large mountain mass lying e. and w., and steep on both sides—calculated the E.'s mean density to be five times greater than that of water. The observed deflection of the plummet in these experiments was between 4" and 5". (2.) In the method just described, there must always be uncertainty, however accurate the observations, in regard to the mass or weight of the mountain. The method known as *Cavendish's experiment* is much freer from liability to error. This experiment was first made by Henry Cavendish on the suggestion of Michel, and has since been repeated by Reich of Freyberg, and Mr. Francis Baily. In the apparatus used by Mr. Baily two small balls at the extremities of a fine rod are suspended by a wire, and their position carefully observed by the aid of a telescope. Large balls of lead placed on a turning-frame, the center of which is in the prolongation of the suspending wire, are then brought near them in such a way that they can affect them only by the force of their attraction. On the large balls being so placed, the small ones move towards them through a small space, which is carefully measured. The position of the large balls is then reversed—i.e., they are placed at the same angular distance on the other side of the small balls—and the change of position of the small balls is again observed. Many observations are made, till the exact amount of the deviation of the small balls is ascertained beyond doubt. Then by calculation the amount of attraction of the large balls to produce this deviation is easily obtained. Having reached this, the next question is, what would their attraction be if they were as large as the earth? This is easily answered, and hence, as we know the attractive force of the E., we can at once compare its mean density with that of lead. Mr. Baily's experiments lead to the result that the E.'s mean density is 5.67 times that of water. (3.) A third mode has lately been adopted by the astronomer-royal, by comparison of two invariable pendulums, one at the E.'s surface, the other at the bottom of a pit at Harton colliery, near Newcastle, 1260 ft. below the surface. The density of the E., as ascertained from this experiment, is 6 and 7 times that of water; but for various reasons this result is not to be accepted as against that of the Cavendish experiment, and it is said that the astronomer-royal was himself dissatisfied with it, and meant to repeat the experiment with new precautions. The density of the E. being known, its mass is easily calculated, and made a unit of mass for measuring that of the other bodies in the system. It is found that the mass of the E. compared with that of the sun is .000028173.

3. *The Motions of the Earth.*—The E., as a member of the solar system, moves along with the other planets round the sun from w. to east. This is contrary to our sensible impressions, according to which the sun seems to move round the E.; it was not till a few centuries ago that men were able to get over this illusion. See COPERNICAN SYSTEM. This journey round the sun is performed in about 365 $\frac{1}{4}$ days, which we call a year (solar year). The E.'s path or orbit is not strictly a circle, but an ellipse of small eccentricity, in one of the foci of which is the sun. It follows that the E. is not equally distant from the sun at all times of the year; it is nearest, or in perihelion, at the beginning of the year, or when the northern hemisphere has winter; and at its greatest distance, or aphelion, about the middle of the year, or during the summer of the northern hemisphere. The difference of distance, however, is comparatively too small to exercise any perceptible influence on the heat derived from the sun, and the variation of the seasons has a quite different cause. The least distance of the sun from the E. is over 92 millions of miles, and the greatest over 96 millions; the mean distance is commonly stated at 95 millions of miles. If the mean distance be taken as unity, then the greatest and least are respectively represented by 1.01679, and 0.98321. It follows that the E. yearly describes a path of upwards of 580 millions of miles, so that its velocity in its orbit is about 18 m. in a second.

Besides its annual motion round the sun, the E. has a daily motion or rotation on its axis, or shorter diameter, which is performed from w. to e., and occupies exactly 23 hours, 56 minutes, 4 seconds of mean time. On this motion depend the rising and setting of the sun, or the vicissitudes of day and night. The relative lengths of day and night depend upon the angle formed by the E.'s axis with the plane of its orbit. If the axes were perpendicular to the plane of the orbit, day and night would be equal during the whole year over all the E., and there would be no change of seasons; but the axis makes with the orbit an angle of $23\frac{1}{2}^{\circ}$, and the consequence of this is all that variety of seasons and of climates that we find on the E.'s surface; for it is only for a small strip (theoretically, for a mere line) lying under the equator that the days and nights are equal all the year; at all other places, this equality only occurs on the two days in each year when the sun seems to pass through the celestial equator, i.e., about the 21st of Mar., and the 23d of September. From Mar. 21, the sun departs from the equator towards the n., till, about June 21, he has reached a n. declination of $23\frac{1}{2}^{\circ}$, when he again approaches the equator, which he reaches about Sept. 23. He then advances southward, and about Dec. 21, has reached a s. declination of $23\frac{1}{2}^{\circ}$, when he turns once more towards the equator, at which he arrives, Mar. 21. The 21st of June is the longest day in the northern hemisphere, and the shortest in the southern; with the 21st of Dec. it is the reverse.

The velocity of the E.'s rotation on its axis evidently increases gradually from the poles to the equator, where it is about equal to that of a musket-ball, being at the rate of 24,840 m. a day, or about 1440 ft. in a second.

A direct proof of the rotation of the E. is furnished by its compression at the poles. There are indubitable indications that the E. was originally fluid, or at least soft; and in that condition it must have assumed the spherical shape. The only cause, then, that can be assigned for the fact that it has not done so, is its rotation on its axis. Calculation also shows that the amount of compression which the E. actually has, corresponds exactly to what its known velocity and mass must have produced. Experiments with the pendulum, too, show a decrease of the force of gravity from the poles towards the equator; and though a part of this decrease is owing to the want of perfect sphericity, the greatest part arises from the centrifugal force caused by the motion of rotation. Another direct proof of the same hypothesis may be drawn from the observation that bodies dropped from a considerable height deviate towards the e. from the vertical line. This fact has been established by the experiments of Benzenberg and others. In former times, it was believed that if the E. actually revolved in the direction of e., a stone dropped from the top of a tower would fall, not exactly at the foot of the tower, but to the w. of it. Now, as experience, it was argued, shows that this is not the case—that the stone, in fact, does fall at the bottom—we have here a proof that the pretended rotation of the E. does not take place. Even Tycho Brahé and Riccioli held this objection to the doctrine to be unanswerable. But the facts of the case were just the reverse. Newton, with his wonted clearness of vision, saw that, in consequence of the E.'s motion from w. to e., bodies descending from a height must decline from the perpendicular, not westward, but eastward; since, by their greater distance from the E.'s center, they acquire at the top a greater eastward velocity than the surface of the E. has at the bottom, and retain that velocity during their descent. He therefore proposed that more exact observations should be made to ascertain the fact; but it was not till more than a century afterwards that experiments of sufficient delicacy were made to bring out the expected result satisfactorily. It is difficult to find an elevation sufficiently great for the purpose, as several hundred feet give merely a slight deviation, which it requires great accuracy to observe. If a height of 10,000 ft. could be made available, the deviation would be not less than $7\frac{1}{2}$ feet. The analogy of our E. to the other planets may also be adduced, the rotation of which, with the exception of the smallest and the most distant, is distinctly discernible. Finally, an additional proof of the E.'s rotation was lately given by Léon Foucault's striking experiment with the pendulum. The principle of the experiment is this: that a pendulum once set in motion, and swinging freely, continues to swing in the same plane, while at any place at a distance from the equator the plane of the meridian continues to change its position relative to this fixed plane.—The objection taken to the doctrine of rotation from the fact that we are unconscious of any motion, has little weight. The movement of a vessel in smooth water is not felt, though far less uniform than that of the E.; and as the atmosphere accompanies the E. in its motion, there is no feeling of cutting through it to break the illusion of rest.

If the turning of the E. on its axis is thus proved to be the cause of the apparent daily motion of the heavens, it is an easy step to consider the annual motion of the sun through the constellations of the zodiac as also apparent, and arising from a revolution of the E. about the sun in the same direction of w. to east. If we consider that the mass of the sun is about 359,000 times greater than that of the E., and that by the laws of mechanics, two bodies that revolve round each other, must revolve about their common center of gravity, the idea of the sun revolving about the E. is seen to be simply impossible. The common center of gravity of the two bodies being distant from the center of each inversely as their respective masses, is calculated to be only 267 m. from the center of the sun, and therefore far within his body, which has a diameter of

882,000 miles. But by help of a figure, it is easy to show that the apparent motion of the sun on the ecliptic naturally arises from a motion of the E. about the sun. The motions of the planets also, that appear so complicated and irregular as seen by us, can only be satisfactorily explained by assuming that they too revolve round the sun in the same direction as the earth. See PRECESSION and NUTATION for an account of a small periodic motion of the E.'s axis and its effects.

4. *The Earth's Temperature.* See CLIMATE; METEOROLOGY as to the phenomena of heat on the E.'s surface. As we go below the surface, we reach a depth beyond which the interior of the E. seems to have no sympathy with the external causes of heat or cold, and its heat appears to be its own, and to increase according to a fixed law the deeper we descend. The average rate of observed increase is 1° F. for a descent of between 40 and 50 feet. If this law were universal—which we do not know it to be—at a depth of less than 30 miles the heat would be such as to hold in fusion all known substances, and the E. would have to be regarded as a very thin crust or shell full of molten liquid. This theory of a molten interior obtained at one time extensive currency among philosophers, being indorsed with the names of Fourier and Humboldt; but it has since been shown to be inconsistent with the rigidity which astronomical observations prove the E. to possess. A liquid nucleus would be subject to tides like the ocean, and the crust would partake of the motion. Granting the increase of heat to be constant, we do not know what effect the increasing pressure may have in preventing fusion.

EARTH-CLOSET. See SEWAGE EARTH-CLOSET.

EARTHENWARE. See POTTERY.

EARTH-HOUSES, EIRD-HOUSES, or YIRD-HOUSES, the name which seems to have been generally given throughout Scotland to the under-ground buildings which in some places are called also "*Picts' houses*" (q.v.), and in others, it would appear "*weems*," or caves. Martin, in his *Description of the Western Islands*, printed in 1703, when their use would appear to have been still remembered, speaks of them as "*little stone-houses built under ground, called earth-houses, which served to hide a few people and their goods in time of war.*" The earth-house, in its simplest form, is a single, irregularly shaped chamber, from 4 to 10 ft. in width, from 20 to 60 ft. in length, and from 4 to 7 ft. in height, built of unhewn and uncemented stones, roofed by unhewn flags, and entered from near the top by a rude doorway, so low and narrow that only one man can slide down through it at a time. When the chamber is unusually wide, the side-walls converge, one stone overlapping another, until the space at the top can be spanned by stones of 4 or 5 ft. in length. In its more advanced form, the earth-house shows two or more chambers, communicating with one another by a narrow passage. There are instances in which one of the chambers has the circular shape and dome-roof to which archæologists have given the name of the "*Beehive-house*" (q.v.). Occasionally, as many as forty or fifty earth-houses are found in the same spot, as in the moor of Clova, not far from Kildrumny, in Aberdeenshire. They appear to have been almost invariably built in dry places, such as gravelly knolls, steep banks of rivers, and hill-sides. They are generally so near the surface of the ground that the plow strikes upon the flagstones of the roof, and thus leads to their discovery. The object most frequently found in them is a stone quern, or hand-mill, not differing from that which continued to be used in remote corners of Scotland within the memory of living men. Along with the quern are generally found ashes, bones, and deer's horns; and more rarely small round plates of stone or slate, earthen vessels, cups and implements of bone, stone celts, bronze swords, gold rings, and the like. Occasionally the surface of the ground beside the earth-house shows vestiges of what are supposed to have been rude dwelling-houses, and folds or inclosures for cattle. This, with other things, would indicate that the earth-houses of Scotland and Ireland (for they are found also in that island) were put to the same purpose as the caves which, as Tacitus (writing in the 2d c.) tells us, the Germans of his day dug in the earth, as storehouses for their corn, and as places of retreat for themselves during winter or in time of war.

EARTH-NUT, a popular name for the tubers of certain umbelliferous plants, particularly *bunium bulbocastanum* and *B. flexuosum*, which are common in most parts of Europe. Names of the same signification are given to them in a number of European languages. *Arnut*, *yernut*, and *jurnut*, Scotch and English provincial names, are corruptions of earth-nut. **PIG-NUT** is another common English name, pigs being very fond of these tubers, grubbing up the ground in quest of them, and soon becoming fat upon them. They are also called *earth-chestnut*, from their resemblance in taste and qualities to chestnuts, perhaps also from their resemblance in size, and their being black or very dark brown externally, and white within. By some they are preferred to chestnuts, and they are much used for food in different parts of Europe, and occasionally in some parts of England, either roasted or in soups. They are wholesome and nutritious; they form an article of trade in Sweden, and have sometimes been recommended as worthy of an attention which they have never yet received in Britain. The two species are very similar in general appearance, although *B. bulbocastanum* has by some botanists been referred to the genus *carum* (caraway), because its carpels have single vittæ between the ribs, whilst *B. flexuosum* has three. The former is also a plant of stouter habit.

Both have umbels of small white flowers, much divided leaves with very narrow segments, and a single roundish tuber at the foot of each plant. *B. flexuosum* is common in woods, pastures, waysides, etc., in most parts of Britain. *B. bulbocastanum* is found only in some of the chalk districts of England, but is abundant in many parts of Europe. *B. ferulaceum* likewise affords tubers, which are used as food in Greece.—The somewhat similar tubers of another umbelliferous plant, *oenanthe pimpinelloides*, which grows in the pastures of some parts of the s. of England, are sometimes also used for food, notwithstanding the very poisonous qualities of some of its congeners. See WATER-DROPWORT.—A Himalayan umbelliferous plant (*cheerophyllum tuberosum*), a species of chervil (q. v.), yields edible tubers or *earth-nuts*.—The name earth-nut is sometimes extended to other small tuberous roots of similar quality, although produced by plants widely remote in the botanical system, as *apios tuberosa* and *lathyrus tuberosus*.

EARTH, POPULATION OF THE. See **POPULATION OF THE WORLD.**

EARTHQUAKE, the term applied to any tremor or shaking of the solid crust of the earth. The frequent occurrence of earthquakes, their destruction to life and property, their influence upon the solid surface of the earth, and the mysteriousness of their cause, force them upon our attention. It is estimated that 12 or 13 earthquakes, destructive more or less of life and property, occur every year, and it is well known that the surface of the globe is never free from sensible evidence of the continued operation of E. agency—that in some quarter or another tremors or slight shakings are always taking place. When these are of a serious nature, whole cities have been destroyed; fertile districts, with all their fruits and grain, have been laid waste; and enormous masses of human beings have lost their lives. No less than 60,000 perished in the great Lisbon E.; while in that of Calabria, in the end of last century, 40,000 were destroyed. It is estimated that as many as 13,000,000 of the human race have thus perished! The great changes which earthquakes produce on the earth's surface deserve the careful attention of the geologist. They disclose to him an agency which seems to have been at work during every period of the earth's history, and which has altered the earth's surface to an extent that can scarcely be imagined. The observed results of earthquakes which more immediately demand his attention are such as these: the new lakes and river-courses which they form, at the same time obliterating the old ones; the new valleys which they hollow out; the fissures of various sizes they form; and the immense landslips they frequently produce. But the mysterious nature of the producing cause of earthquakes is also a strong incentive to their study. It is unfortunately true, that the most popular scientific inquiries are those in which the imagination has large play: dry inductions from observed phenomena are not suited to the genius of popular modern science. Consequently, earthquakes, where every attempt at explaining their origin is theoretical, from the impossibility of obtaining direct observation, affording as they do a wide field for the play of the poetic faculty, find plenty of students.

No portion of the earth's surface is exempt from the influence of earthquakes. Egypt has been less visited than perhaps any other country, but even here we have the record of one which took place in 1740 A. D.; and Holland, with its loose alluvial deposits, has also felt their power. Nor is the bed of the ocean exempt; records of many sub-aqueous earthquakes exist, taken by vessels at sea, sometimes passing over the point of greatest disturbance at the moment of the shock. In like manner earthquakes have been active at every period of the earth's existence, breaking up its solid crust, elevating or depressing its surface, and doing as much as any other single agent to bring it into its present condition. They have been probably at some periods more active than at others, just as we find that some districts are now more liable than others to their visitation. So well defined, indeed, are the localities where earthquakes occur, that it is easy to exhibit their limits on a map. They are most frequent around the present lines or centers of volcanic action (see **VOLCANO**); and their frequency and violence seem to bear some relation to the activity and intensity of the associated volcanoes. Observers of volcanic phenomena have noticed that every great eruption, in whatever part of the world observed, and whether from a volcanic vent on land or beneath the ocean, is accompanied by E. shocks of greater or less violence and duration; while, on the other hand, those observing earthquakes speak of them as accompanied by volcanic eruptions, and of their often being stopped on the opening of volcanic vents. It is, however, an important fact that, although regions of active volcanic action are those of most frequent E. movements, yet the most violent earthquakes do not appear to have occurred in these regions, but, on the contrary, in districts lying some degrees away from the nearest volcanic action, as, for instance, in the famous E. of Lisbon. Districts in which there are extinct volcanoes are not more liable to such visitations than non-volcanic regions.

The phenomena connected with earthquakes have been variously described. Many writers refer to appearances in the heavens, or changes in the atmosphere, which to them seem to have some connection with the catastrophes they narrate. They tell of irregularities in the season preceding or following the shock, of sudden gusts of wind interrupted by sudden calms, of violent rains at unusual seasons, or in countries where such phenomena are almost unknown, of a reddening of the sun's disk, of a haziness

in the air often continued for months, and similar phenomena. But these are so irregular in their appearance, and have been so seldom observed associated with more than a single E., that, in the absence of any decided reason to the contrary, there seem good grounds for believing they have no real connection with the earthquake. It is different with underground noises, which frequently precede, accompany, or succeed the occurrence of earthquakes, or some of the shocks of them. They are undoubtedly intimately connected with the shock, yet earthquakes occur, even of the greatest violence, which are unaccompanied by any sound whatever. Different descriptions have been given of these subterranean noises. In some earthquakes, they are likened to chains pulled about, increasing to thunder; in others, the sound is like the rumbling of carriages, growing gradually louder, until it equals the loudest artillery; or like heavy wagons running away upon a road; or distant thunder; or like the hissing produced by the quenching of masses of red-hot iron in water; or like the rush of wind underground. As there have been earthquakes without subterranean noises, so there are frequently, in South America and elsewhere, underground sounds which are not followed by earthquakes.

The more intimate earthquake-phenomena are more uniform. Sometimes there is nothing else felt than a trembling or gentle motion of the surface, without producing any injury. In severe earthquakes, the almost invariable succession of phenomena is first a trembling, then a severe shock, or a succession of shocks, and then a trembling, gradually becoming insensible. The violent shocks are instantaneous, and very few in number, sometimes only one, usually not more than three or four. In the intervals between these, smaller shocks or tremblings take place. The severe shocks do the mischief. At the point or line of greatest disturbance, the shock has a distinctly vertical direction, coming from below upwards. As we leave this point, the direction of the motion becomes more and more horizontal, gradually also decreasing in intensity until it becomes insensible. This progressive movement is produced by an earth-wave or true undulation of the solid crust of the earth. The whole mass of the area is not moved at once, but only the wave-crest. In the case of the earthquake at Lisbon, the progress of the wave was roughly calculated; it was shown to have had a very great velocity, and to have lasted only for an instant at any one spot. The area affected on this occasion was very extensive. The shock was felt on the one side as far as the southern shores of Finland, and on the other it reached beyond the St. Lawrence in Canada, and was observed in some of the West India islands—an area of no less than 7,500,000 sq. miles. The force required to move this must have been enormous, for, suppose the thickness of the earth's crust moved to have been no more than 20 m., then 150,000,000 cubic m. of solid matter was moved. The influence of this earth-wave is communicated to the sea, when the E. is near the shore, or on the bed of the ocean. The sea swells, and slightly retires from the beach, and then a great wave rolls in upon the shore. At the Lisbon E., this wave rose to a height of 60 ft. at Cadiz. It carries with it sea-spoil, scattering it over the surface of the earth, far beyond the ordinary reach of the sea.

Of the various theories as to the nature of earthquakes, we can only refer to the most important. All theorists are agreed as to the connection between volcanoes and earthquakes; that they are produced by the same subterranean agency. The existence of molten matter in the interior of the earth, is the starting-point in all except the chemical theory propounded by Davy, which, though in the end abandoned by him, still finds supporters. When he discovered the metallic bases of the earths and alkalies, he threw out the idea that those metals might abound in an unoxidized state in the subterranean regions, to which water must occasionally penetrate. When this occurred, gaseous matter would be set free, sufficient to produce the E., the metals would combine with the oxygen of the water, and heat enough would be evolved to melt the surrounding rocks.

Mr. Mallet, in an elaborate report on the subject presented to the British association, proposed an ingenious theory. He assumes that volcanoes, and the centers of E. disturbances, are near the sea, or other large supplies of water; and he says that when an irruption of igneous matter takes place beneath the sea-bottom, the first action must be to open up large fissures in its rocky material, or to lift and remove its incoherent portions, such as sand, mud, gravel, etc. The water on meeting the heated surfaces assumes the spheroidal state; while in this condition, the intestine motion may be great, but little steam is generated; but no sooner have the surfaces cooled, than the water comes into close contact with them, and a vast volume of steam is evolved explosively, and blown off into the deep and cold water of the sea, where it is condensed, and thus a blow of the most tremendous sort is given at the volcanic focus, and being transferred outwardly in all directions, is transmitted as the E. shock. The surfaces of the ignited material, however, now cooled down below the point at which steam can be generated rapidly, merely keep up a gentle ebullition, which is transmitted as the trembling after the shock. On the surfaces again becoming heated by conduction from the molten mass, the various phases are again repeated. This he considers the chief cause of earthquakes, but he supposes they may also be due to the evolution of steam through fissures, and its irregular and *per saltum* condensation under pressure of seawater; or to great fractures and dislocations in the rocky crust, suddenly produced by pressure acting on it from beneath, or in any other direction.

The old assumption that the earth consists of a molten fluid core with a cooled and hardened rind floating upon it, is inconsistent with the rigidity that astronomers have proved the earth to possess. But although the earth must be mainly solid, it is yet believed to be of a honey-combed structure, and that the cavities contain in many places lakes of molten rock, between which and the surface volcanoes are orifices of communication. Into these cavities, water sinking down through crevices from the ocean or the land must be constantly finding its way; and the steam thus generated exerts such enormous pressure as to force the molten matter to the surface, itself mingling and escaping along with it. When a mass of water is suddenly precipitated into a hot cavern, the explosion of steam will cause an earthquake concussion, and where there is no vent, may be sufficient to rend the superincumbent strata. The celebrated Lisbon earthquake, of 1755, was severely felt in the middle and eastern U. S., and high waves appeared in the harbors of New York and Boston. In Oct., 1811, an earthquake extended from the mouth of the Ohio river 300 m. southward, continuing its disturbances until March 26, 1812. A shock, Oct. 19, 1870, covered the area including Quebec, St. John, N. B., Chicago, and New York, and the velocity of the wave was estimated at 14,000 ft. per second. Nov. 18, 1878, an area of 150,000 sq. m. in the Mississippi valley was disturbed. The heaviest earthquakes on the Pacific coast in this century were in 1868 and 1872. In August, 1884, the area including Washington, Toledo, O., and Portland, Me., was shaken. The shock of August 31, 1886, covered 20 states, and was felt from Ontario, Canada, to Bartow, Fla., and westward to Detroit. The direction of the vibrations was from s.e. to n.w.; but no tidal wave followed, as was expected. The earthquakes in North America in 1885 were distributed as follows: Canadian provinces, 8; New England, 5; Atlantic states, 9; Mississippi valley, 3; Pacific coast, 34. Record for period 1872-83: Atlantic slope, 147; Mississippi valley, 66; Pacific slope, 151. In the entire area they occur on an average once in 12 days, and on the Atlantic slope once a month.

In 1692 the island of Jamaica was so agitated that planted fields changed places. The coast of Venezuela was shaken from Oct. 21, 1766, to Dec., 1767. Caracas was destroyed, March 26, 1812, the shocks continuing 10 days. In 1868 large cities in Ecuador were swallowed up; Arica and Arequipa, Peru, were destroyed; and the sea retreated from the harbor of Arica, sending, on its returning wave, a U. S. steamer two m. inland.

EARTHS, in chemistry, are a class of substances regarded by the alchemists and older chemists as elementary, and which are insoluble in water. The earths *proper* are now known to be compound, consisting of a metal in combination with oxygen. The list includes alumina, glucina, zirconia, thoria, didymia, lanthana, ceria, yttria, terbia, erbia. They do not alter vegetable colors, are soluble in acids, and are precipitated from their solutions by ammonia, potash, or soda. The *Alkaline Earths* have already been noticed. See **ALKALIES**.

EARTH-SHINE, the reflection from the moon of the light cast upon her by the earth, particularly noticeable in clear nights at the time of new moon, when sometimes the whole surface of the moon can be seen in ashy colored light. The earth serves the same purpose to the moon that the moon does to the earth; that is, the earth is the moon's moon, and would present to an observer on the moon the same phases that the moon does to us; but the earth would, to an observer from the moon, appear four times as large as the moon does to us. When it is new moon to us, it is full moon to an observer on the side of the moon facing the earth, and, as the earth is much the larger, it gives to the moon about 16 times as much light as the full moon gives to us. This light, reflected back to us, is known as earth-shine. It is really the light of the sun reflected by the earth to the moon, and by the moon back to the earth.

EARTHWORKS. The largely increased use of hasty earthworks on the field of battle is the result of the range and rapidity of fire of the modern rifle, and of the range and shell power of rifled artillery. It is the absolute necessity of shelter from the intensity of fire, while at the same time giving full scope to its effects, which has brought the entrenching tool into such notice, and made it almost one of the weapons of the foot soldier of our time. One of the most striking features of the modern fortified position is the long lines of shelter trenches and improvised cover, all raced to direct fire to their front; the cleared foreground, and further, the large amount of splinter-proof cover required for full protection from rifle and shrapnel bullets. In all other kinds of land defenses the broken traces, adapted to the fire combat, when rifles had less range than now, have given way in favor of simple forms providing much frontal fire. The profiles, too, have undergone a corresponding modification. The interior trench has become a necessity for cover as well as for rapidity of execution, and it has often to be blinded, as for instance in the Plevna works. The ditch in front, which used always to be made deep, with as steep sides as possible, is now very generally made shallow, so as to be swept as far as may be by fire from the parapet. The exterior slope of the parapet is made much more gentle, to diminish the effect of high velocity shells. The self-flanking bastioned trace has disappeared from the scene, alike in field and permanent works, trust being placed in the withering effects at close quarters of the magazine gun. It is proposed overcoming the dislike on the part of the infantry soldier to work on entrenchments when in the field by peace training. No sadder instance of unreadiness in this particular is to be found in modern wars than the attack of the Green Hills by the Rus-

sian general Skobelev. To get cover from the fearful fire of the Turks, the Russian soldiers tried to scrape up earth with the covers of mess-tins, bayonets, and their fingers, and even resorted to piling up the bodies of the dead. After this experience they were glad to carry a shovel weighing 5 lbs. See further under FORTIFICATION.

EARTHWORM, *Lumbricus*, a genus of *annelida* (q.v.), of the order *terricole*. There are many species, all of them pretty closely resembling in characters and habits the common E. or dew-worm (*L. terrestris*), which is everywhere plentiful in Britain and throughout Europe, and is familiar to everybody. It has no head distinct from the body, no eyes, no antennæ, nor any organs external to the rings of which its body is composed, except minute bristles pointing backwards, of which each ring bears four pair, and which are of use in its locomotion. It sometimes attains to nearly a foot in length, and more than 120 rings have been counted in its body. The end at which the mouth is situated is pointed, and the tail is flattened, whilst the general form is cylindrical. The mouth consists merely of two lips, the upper lip elongated; there are no teeth nor tentacles, and the worm subsists by swallowing fine particles of the soil, from which its digestive organs extract the digestible matter, the rest being voided often in little intestine shaped heaps, called *worm-casts*, on the surface of the ground. The locomotion of the E. is effected by means of two sets of muscles, which enable it to contract and dilate its rings; its bristles preventing motion backwards, and the whole muscular effort thus resulting in progress; whilst the expansion of the rings, as it contracts the anterior segments, and draws forward the hinder parts, widens a passage for it through earth whose particles were close together before. Earthworms are thus of very great use, their multitudes continually stirring and loosening the soil through which they work their way; and moles, pursuing them to feed on them, stir and loosen it still more; whilst worm-casts gradually accumulate on the surface to form a layer of the very finest soil, to which it is supposed that the best old pastures in a great measure owe their high value.

Earthworms do not often visit the surface of the ground, except during night, and when the ground is moist. In the evening, during or after rain, or in the morning, when the dew is abundant, they may sometimes be seen traveling about in great numbers. Both drought and cold cause them to retreat more deeply into the earth.—Their respiration is effected by means of little sacs, which communicate by minute pores with the external air. They are hermaphrodite, but mutual fecundation takes place by means of the thickened knot (*clitellum*) which is situated before the middle of their body. Their eggs often contain two embryos, and the young worms escape by a sort of valvular opening at the end.

Besides their usefulness in the improvement of the soil, earthworms are of importance as food for birds, fishes, etc. Their value as bait for fishes is well known to every angler. The instinct which prompts them to hasten to the surface, when, in quest of bait, the angler shakes the soil with a spade or fork, is probably to be referred to the similar shaking on the approach of their constant enemy, the mole.

An E. of great size is common in the East Indies, wherever the climate is moist, from the Himalaya to Ceylon and Java. Much interesting light was thrown on earth worms in Mr. Darwin's work, *The Formation of Vegetable Mould through the Action of Worms* (1881).

EAR-TRUMPET, a contrivance for improving the hearing of the partially deaf. For this purpose many ingenious instruments have been devised. The principle in them all is the same: to collect the sonorous vibrations, and to convey them in an intensified form to the deeper parts of the ear. In this way the hand placed behind the external ear constitutes the simplest form of ear-trumpet. Though, in a great number of cases of impaired hearing, there can be no doubt that much assistance and comfort are obtained from the use of one or other of the varieties of the ear-trumpet, still they must not be used indiscriminately, for in unsuitable cases they often do much mischief, both by increasing the deafness, and aggravating the noises in the head from which deaf persons often suffer so much. They are of most use, perhaps, in advanced cases of nervous deafness, though injurious in the early stages of this complaint; they are hurtful also in all acute diseases of the organ, and of little or no use in those cases of great thickening of the contents of the middle ear, where the adapting power of the organ has been lost. There are many varieties of trumpet in common use. It is generally admitted that most of the small and so-called invisible ear-trumpets are practically useless. All of the useful instruments have good-sized bowls, which in some cases rest against the temple when inserted in the ear, thus aiding the hearing by bone conduction. The best expedient for obviating roaring and indistinct sounds is the use of wire meshes, called refiners. Different combinations of various sized meshes are placed over the mouth of the trumpet, the choice of refiners being a matter of experiment for the patient. The apparatus most commonly in use requires to be held in the hand, and consists of a narrow portion inserted into the ear-passage, and which gradually expands into a wide mouth; or the extremity of the instrument may be turned downwards, as in that form which passes by the name of Miss Martineau's trumpet. Another variety, applicable to the more severe cases of deafness, consists of an elastic tube, one end of which is tipped with ivory and is placed in the ear of the patient; the other is held in the hand of the speaker, who applies his mouth to the open extremity. Ear-trumpets are generally made of some thin metallic substance, such as tin. Gutta-percha, and other substances are also frequently used. See AUDIPHONE.

EARWIG, *Forficula*, a genus of orthopterous insects, recently subdivided into a number of genera, and forming the family *forficulidæ*, which many entomologists constitute into a distinct order, *dermaptera* (Gr. leather-winged). These insects indeed connect the true *orthoptera* with the *coleoptera*. Their legs are formed for running, and not for leaping; their wing-covers (*elytra*)—which are very small, and hide only a small part of the abdomen—are of firmer substance than in the other *orthoptera*; the wings, of which there are two sets—hind and fore wings—are curiously folded under them, both longitudinally, in a fan-like manner, and transversely; the organs of the mouth resemble those of the true *orthoptera*, with which also earwigs agree in the important character of *semi-complete* metamorphosis; the larvæ and pupæ much resembling the perfect insect, running about and feeding in the same manner, but the larvæ being destitute of wings and wing-covers, the pupæ having them only in a rudimentary state. Earwigs have the body narrow, and of nearly equal breadth throughout, the head exposed, the mandibles very strong and horny, the antennæ long and thread-shaped. The abdomen bears at its extremity a large pair of forceps, apparently of use as an instrument of defence. Earwigs abound in moist situations, as under the decayed bark of trees, under stones, among decaying straw, etc. They feed both on animal and vegetable food; the COMMON E. (*F. auricularia*), very abundant in America and in most parts of Europe, is troublesome to gardeners by eating the leaves of plants and the petals of fine flowers; but the injury which it does is probably more than compensated, particularly as to field-crops, by the destruction of multitudes of smaller insects, as *thrips*, *aphis*, etc. The appearance of this insect is by no means agreeable, and its mandibles and forceps are suggestive of unpleasant possibilities, which, however, would seem never to be realized, although it is a very frequent visitor of houses, particularly those of which the walls are covered with foliage. It is curious how extensively prevalent the notion is that earwigs creep into the ear. To this they owe their English name (E. from *ear*, and Sax. *wiega*, a worm or grub), and their names in many languages, as the French *perceoreille*, the German *Ohrwurm*, etc. Newman, in his *Introduction to the History of Insects*, says: "The shape of these wings (the hind ones), when fully opened, is nearly that of the human ear; and from this circumstance it seems highly probable that the original name of this insect was *earwing*." See *illus.*, BEETLES, ETC., vol. II.

EAS'DALE, a small isle on the w. coast of Argyleshire, in the firth of Lorn, 10 m. s.s.w. of Oban. It contains $1\frac{1}{2}$ sq. m., and is situated in Kilbrandon parish. It is noted for its primary or metamorphic slate-quarries, belonging to the marquis of Breadalbane, which have been wrought for more than 150 years. Compact feldspar and conglomerate also occur in the isle.

EASEL. This structure, the object of which is to support the canvas or panel of the artist at a convenient height for work, has been used for ages pretty much in its present form.

EASEMENT is a legal term signifying some right of the public, or of an individual, in lands owned by another; a right existing either at common law or by statute; such, for example, as the right of way across another's estate, or to receive water from, or discharge it across, such estate. The E. is either affirmative or negative; affirmative when the owner of an estate is entitled to do something on the estate of another; negative when he is forbidden to do something, otherwise lawful, on his own premises. It may arise from the nature of things, or from special contract, express or implied. It is an E. when the owner of land makes a grant thereof for public use, as for a road or park, whereby the public gains only a right of use for the purpose specified, the title still remaining with the grantor. An E. in the land of another may also be acquired by prescription—that is, by the continuous and open enjoyment of a privilege without objection for a certain term of years. Easements may be extinguished by release or abandonment, or by a union of the two estates in the same person.

EAST (Ger. *Ost*; allied probably to Greek *ēōs*, the morning, and Lat. *oriens*, the rising, i.e., sun) is, vaguely speaking, that quarter of the horizon where the sun rises, or which a person with his face to the s. has on his left hand. It is only at the equinoxes that the sun rises exactly in the e. point. A line at right angles to the meridian of a place points exactly e. and west. See **MERIDIAN** and **HORIZON**.

From very early times, the e. has been invested with a certain sacred character, or at least held in respect over other points of the compass. It was the practice of the ancient pagans to fix their altar in the eastern part of their temples, so that they might sacrifice towards the rising sun, which in itself was an object of worship. The custom of venerating the e. was perpetuated by the early Christian church from various circumstances mentioned in the sacred record. For example: "The glory of the God of Israel came from the way of the east."—Ezek. xliii. 2. "There came wise men from the east to Jerusalem."—Matt. ii. 1. "And, lo, the star, which they saw in the east, went before them."—Matt. ii. 9. Tradition heightened respect for the east. It was said that Christ had been placed in the tomb with his feet towards the e., and that at

the day of judgment he should come from the eastward in the heavens. Looking towards the sun in the e. in praying or repeating the creed, was thought to put worshippers in remembrance that Christ is the son of righteousness, and such an attitude was accordingly adopted as an aid to devotion. From these various circumstances, the building of churches with the chancel (q.v.) to the e., bowing to the e. on uttering the name of Jesus, and burying with the feet to the e., were introduced as customs in the church. In recent times there has been a general disregard to the practice of turning formally with the face to the e. on repeating the creed, and, as is well known, the attempt to revive it by a party in the English church has caused considerable dispeace. It is a curious instance of the inveteracy of popular custom, that in Scotland, where everything that savored of ancient usage was set aside as popish by the reformers, the practice of burying with the feet to the e. was maintained in the old churchyards, nor is it uncommon still to set down churches with a scrupulous regard to e. and west. In modern cemeteries in England and Scotland, no attention appears to be paid to the old punctilio of interring with the feet to the e., the nature of the ground alone being considered in the disposition of graves.

EAST BATON ROUGE, a parish in s.e. Louisiana, between the Mississippi and Amite rivers, 450 sq. m.; pop. '70, 17,816—11,343 colored; in '90, 25,922. Surface, generally level, with fertile soil, producing corn, cotton, sugar, molasses, etc. Seat of justice, Baton Rouge.

EASTBOURNE, a rising wateringplace in the s.e. of Sussex, Eng. It lies in a chasm between two cliffs, one of which, 3 m. to the s.e., forms Beachy Head. In the vicinity are fine drives and walks. It has a martello tower and a fort. Pop. of parish, '91, 34,977. E. is supposed to have been of Roman origin, and remains of a Roman villa, bath, and tessellated pavements have been found here.

EAST BRIDGEWATER, a town in Plymouth co., Mass., 25 m. s.e. of Boston on the New York, New Haven, and Hartford railroad. There is abundant water power, and an iron foundry, and manufactories of cotton gins, linters, and shoe machinery. The town has a high school, public library, savings bank, and excellent artesian well water. Pop. '90, 2911.

EASTBURN, JAMES WALLIS, 1797-1819; b. England; came to America when a child; graduated at Columbia college in 1816, and studied theology with the purpose of taking orders in the Episcopal church. While a student he began a new metrical version of the Psalms. He was joint author with Robert C. Sands of *Yamoyden*, a romance founded upon the life of Philip, the Narragansett king; and he wrote many small poems. In 1818, he was ordained and took charge of a church in Virginia, but died while on a voyage to the West Indies for his health.

EASTBURN, MANTON, D.D., 1801-72; b. England; brother of James Wallis; came to the United States when a child; graduated at Columbia college, 1817; studied in the Episcopal theological seminary, and was ordained to the ministry, 1825. He was for several years rector of the church of the Ascension, New York, and in 1843 became bishop of Massachusetts. He published *Lectures on Hebrew, Latin, and English Poetry*; *Essays and Dissertations on Biblical Literature*; *Lectures on the Epistle to the Philippians*; and many sermons and addresses. He gave the most of his property to religious and benevolent institutions.

EAST CAPE, the name of the most easterly headlands of the island of Madagascar, of the North island of New Zealand, and of Siberia or Asiatic Russia. The *first* is in lat. 15° 20' s., and long. 50° 15' e.; the *second* in lat. 37° 40' s., and long. 178° 40' e., being almost precisely the antipodes of Carthage in Spain; and the *third* is that extremity of the old world which is nearest to the new, being separated by Behring's strait (q.v.) from cape Prince of Wales in America. It is in lat. 66° 6' n., and long. 169° 38' w.; or rather, to follow the natural reckoning, 190° 22' east.

EAST CARROLL, a parish (co.) in n.e. Louisiana; formed 1877 from part of Carroll; bounded e. by Mississippi; intersected by Tensas river and Bayou Macon; surface well timbered; soil fertile. Area, 400 sq. m.; pop. '90, 12,362. Co. seat, Lake Providence.

EASTER (Ger. *ostern*, Fr. *pâque*, Scot. *pasch*, from Gr. *pascha*, the passover), the festival of the resurrection of Jesus Christ, derives probably its Teutonic name from the festival of the goddess Ostara, in Ang.-Sax. Eastre, which the Saxons of old were wont to celebrate about the same season at which the Christian festival of E. occurs. In the ancient church, the celebration of E. lasted 8 days. After the 11th c., however, it was limited to 3, and in later times, generally to 2 days. It was formerly the favorite time for performing the rite of baptism. The courts of justice were closed, and alms dispensed to the poor and needy, who were even feasted in the churches—a custom which led to much disorder. Slaves also received their freedom at that season; and as the austerities of Lent were over, the people gave themselves up to enjoyment; hence the day was called the "Sunday of joy" (*Domìnica gaudiì*). To the popular sports and dances were added farcical exhibitions, in which even the clergy joined in some places, reciting from the pulpit stories and legends, with a view to stir the hearers to laughter (*risus paschalis*). Against this indecency, the reformers of the 16th c. loudly and successfully raised their voices. During the whole week before E.—that is, in the inter-

val between Palm Sunday and the beginning of the E. festival—daily services were held. See PASSION WEEK and GOOD FRIDAY.

On E. day, the people saluted each other with the E. kiss, and the exclamation *Surrexit* (He is risen); to which the reply was *Vere surrexit* (He is risen indeed). The chief solemnity always consisted of the celebration of the Lord's supper.

The proper time for the celebration of E. has occasioned no little controversy. In the 2d c., a dispute arose on this point between the eastern and western churches. The great mass of the eastern Christians celebrated E. on the 14th day of the first Jewish month or moon, considering it to be equivalent to the Jewish Passover. The western churches celebrated it on the Sunday after the 14th day, holding that it was the commemoration of the resurrection of Jesus. The council of Nice (325 A.D.) decided in favor of the western usage, branding the eastern usage with the name of the "quartadeciman" heresy. This, however, only settled the point that E. was to be held, not upon a certain day of the month or moon, but on a Sunday. The proper astronomical cycle for calculating the occurrence of the E. moon was not determined by this council. It appears, however, that the metonic cycle (q.v.) was already in use in the west for this purpose; and it was on this cycle that the Gregorian calendar, introduced in 1582, was arranged. The method on which this calendar is constructed is too complex for description here. An elaborate account of the whole matter was published by prof. De Morgan in the *Companion to the British Almanac* in 1845, and to this the reader is referred. The time of E. being the most ancient and important of all the movable feasts of the Christian church, determines all the rest. It was debated, at the time of the introduction of the Gregorian calendar, whether E. should continue to be movable, or whether a fixed Sunday, after the 21st of Mar., should not be adopted. It was deference to ancient custom that led the ecclesiastical authorities to adhere to the method of determination by the moon. It must be remembered, however, that it is not the actual moon in the heavens, nor even the mean moon of astronomers, that regulates the time of E., but an altogether imaginary moon, whose periods are so contrived that the new (calendar) moon always follows the real new moon (sometimes by 2, or even 3 days). The effect of this is, that the 14th of the calendar moon—which had, from the times of Moses, been considered "full moon" for ecclesiastical purposes—falls generally on the 15th or 16th of the real moon, and thus after the real full moon, which is generally on the 14th or 15th day. With this explanation, then, of what is meant by "full moon," viz., that it is the 14th day of the calendar moon, the rule is that E. day is always the first Sunday after the paschal full moon, i.e., the full moon which happens upon or next after the 21st of Mar. (the beginning of the ecclesiastical year); and if the full moon happens upon a Sunday, E. day is the Sunday after. For any given year, the day on which the paschal full moon falls, and then E. day, are found by the following table and rule:

| Days of the Month. | Dominical Letter. | Golden Number. | Days of the Month. | Dominical Letter. | Golden Number. |
|--------------------|-------------------|----------------|--------------------|-------------------|----------------|
| March 21..... | C | 14 | April 8..... | G | |
| " 22..... | D | 8 | " 9..... | A | 15 |
| " 23..... | E | .. | " 10..... | B | 4 |
| " 24..... | F | 11 | " 11..... | C | .. |
| " 25..... | G | .. | " 12..... | D | 12 |
| " 26..... | A | 19 | " 13..... | E | 1 |
| " 27..... | B | 8 | " 14..... | F | .. |
| " 28..... | C | .. | " 15..... | G | 9 |
| " 29..... | D | 16 | " 16..... | A | .. |
| " 30..... | E | 5 | " 17..... | B | 17 |
| " 31..... | F | .. | " 18..... | C | 6 |
| April 1..... | G | 13 | " 19..... | D | .. |
| " 2..... | A | 2 | " 20..... | E | .. |
| " 3..... | B | .. | " 21..... | F | .. |
| " 4..... | C | 10 | " 22..... | G | .. |
| " 5..... | D | .. | " 23..... | A | .. |
| " 6..... | E | 18 | " 24..... | B | .. |
| " 7..... | F | 7 | " 25..... | C | .. |

First ascertain the dominical letter (q.v.)—taking the second where there are two—and the golden number (see EPACT); look for the golden number in the third column of the table, and opposite to it stands the day of the full moon; then look for the dominical letter, next after the day of full moon, and the day standing opposite the dominical letter is E. day. It sometimes happens that E. day, as thus determined, is different from what it would be if by "full moon" were understood the astronomical full moon. Thus, in 1818, E. day, by the calendar, fell, and was celebrated on the 22d of Mar., the earliest possible day, although the full moon was on that day; and in 1845, it again fell on the day of the actual full moon (the 23d of Mar.).

One object in arranging the calendar moon was, that E. might never fall on the same day as the Jewish Passover. They did occur together, however, in 1805, on the 14th of April; and in 1825, on the 3d April; and will do so again in 1903, on the 12th April;

in 1923, on the 1st April; in 1927, on the 17th April; and in 1981, on the 19th April. The Jewish festival usually occurs in Passion week, and never before the 26th of Mar., or after the 25th of April (new style). On the other hand, the Christian festival is never before the 22d of Mar., or after the 25th of April. In 1761 and 1818, E. fell on the 22d of Mar.; but neither in this nor the following century will such be the case again. In 1913, it will fall on the 23d of Mar., as it did in 1845 and 1856. The latest Easters in this century and the following, occur in 1886 and 1943, on the 25th of April. In 1848, E. fell on the 23d of Apr., and in 1859, on the 24th of April.

Popular Observances.—Many of the popular observances connected with E. are clearly of pagan origin. The goddess Ostara or Eastre seems to have been the personification of the morning or east (q.v.), and also of the opening year or spring. The Anglo-Saxon name of April was Estormonth; and it is still known in Germany as Ostermonath. The worship of this being seems to have struck deep root in northern Germany, and was brought into England by the Saxons. It continued to be celebrated in many parts in the n. of Germany down to the beginning of the present century, by the kindling of bonfires and numerous other rites. See BELTEIN. Like the May observances of England, it was especially a festival of joy. With her usual policy, the church endeavored to give a Christian significance to such of the rites as could not be rooted out; and in this case, the conversion was particularly easy. Joy at the rising of the natural sun, and at the awaking of nature from the death of winter, became joy at the rising of the Sun of Righteousness—at the resurrection of Christ from the grave. The bonfires can be traced in the great “paschal tapers,” sometimes weighing 300 lbs., with which the churches were lighted on E. eve. In the ancient church disbursements of St. Mary-at-Hill, in the city of London, there is even an entry “For a quarter of coles for the hallowed fire on Easter eve, 6d.”

The most characteristic E. rite, and the one most widely diffused, is the use of *Pasch* (i.e., Easter) eggs. They are usually stained of various colors with dye-woods or herbs, and people mutually make presents of them; sometimes they are kept as amulets, sometimes eaten; games are also played by striking them against one another. In some moorland parts of Scotland, it used to be the custom for young people to go out early on “Pasch Sunday” and search for wild-fowls’ eggs for breakfast, and it was thought lucky to find them. There can be little doubt that the use of eggs at this season was originally symbolical of the revivification of nature—the springing forth of life in spring. The practice is not confined to Christians; the Jews used eggs in the feast of the Passover; and we are told that the Persians, when they keep the festival of the solar new year (in Mar.), mutually present each other with colored eggs.

From the Christian point of view, this “feast of eggs” has been usually considered as emblematic of the resurrection and of a future life.

EASTER, DATE OF. The following are the dates for the occurrence of E. in each year from 1880 to the end of this century :

| | | | | |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| 1880, March 28. | 1885, April 5. | 1889, April 21. | 1893, April 2. | 1897, April 18. |
| 1881, April 17. | 1886, April 25. | 1890, April 6. | 1894, March 25. | 1898, April 10. |
| 1882, April 9. | 1887, April 10. | 1891, March 29. | 1895, April 14. | 1899, April 2. |
| 1883, March 25. | 1888, April 1. | 1892, April 17. | 1896, April 5. | 1900, April 15. |
| 1884, April 13. | | | | |

Other principal days of observance may be found by reckoning from Easter. The first day of Lent (Ash Wednesday) is Wednesday in the 7th week before Easter. The Crucifixion day (Good Friday) is the Friday before Easter. The Ascension day is Thursday, the 40th day after Easter. The Pentecost day (Whitsunday) is the 50th day after E., or the Lord’s day 7th after Easter.

EASTER ISLAND, originally DAVIS’S LAND, is a detached spot on the Pacific, in lat. 27° 20’ s., and long. 109° 30’ west. It is of volcanic origin, rising 1200 ft. above the sea; and it is moderately fertile, but almost destitute of water. It belongs to the Polynesian archipelago, of which it forms the south-easterly extremity. On this island, of 30 miles’ circumference, and inhabited by a population of less than 2,000, there exist multitudes of rude stone statues, some of them of colossal size, and standing on long platforms of Cyclopean masonry. The present inhabitants, whose language is radically the same as that of Tahiti, have no tradition of the race that made them. The existence of these sculptures is thought to strengthen the conclusion, arrived at on other grounds, that the Polynesian islands are relics of a submerged continent.

EASTERN ARCHIPELAGO. See MALAY ARCHIPELAGO.

EASTERN CHURCHES include : I. The Greek church, which contains in Russia about 55,000,000; in Turkey, 11,500,000; in Austria, 3,000,000; in Greece, 1,225,000; and in the United States (chiefly in Alaska), 50,000; in all, more than 70,000,000. II. Armenians, 3,000,000. III. Copts and Abyssinians, 3,000,000. IV. Jacobites (in Turkey and India), 220,000. V. Nestorians, including the Christians of St. Thomas, in India, 165,000. The total in them all is about 76,500,000.

EASTERN EMPIRE. See BYZANTINE EMPIRE.

EASTERN QUESTION, in popular usage, is the problem of the future disposition of the Turkish empire and its territory, as related to the supposed designs of Russia, and to the interests of other European nations, England and Austria in particular. Voltaire, in the time of Catherine II., characterized Turkey as "the sick man," and for a hundred years it has been an assumption of European diplomacy that the empire was on the road to disintegration and death. In these circumstances, Russia, from her geographical position and in accordance with her traditional policy, waits for an opportunity to seize and absorb the territory of "the sick man." Other European nations, each for reasons of its own, dread such an extension of Russian domination. Austria, if Turkey should be despoiled, would naturally claim for herself a slice of the territory; and England fears that if Constantinople should fall into the possession of Russia, the highway to her eastern possessions would be closed, and Russia become dominant in that quarter. The question, moreover, assumes a religious aspect, Turkey being a Mohammedan power, and Russia finding an excuse for aggressive designs in the assumed necessity of affording protection to the Christian populations in the Turkish empire. England, on the other hand, though at the head of the Christian powers, yet being anxious to preserve the autonomy of Turkey as a subservient empire, is placed in a position of seeming indifference to the wrongs which Russia is so zealous to redress. The Crimean war of 1854-56 had its origin in the desire to check the advance of Russia, and the treaty of Paris put that power under sharp restrictions. Russia, by the recent invasion of Turkey, roused again the hostility of the European powers, which found expression in the treaty of Berlin, greatly limiting the fruits of the Russian conquest, and putting that empire under annoying restraints. Turkey was made to promise certain reforms, which, if carried into effect, would deprive Russia of excuse for further aggressions; but the promise has not been and is not likely to be fulfilled: it is doubtful indeed whether the fulfillment is within the power of Turkey. The eastern question, therefore, has not yet reached a permanent solution. Good illustrations of the obstacles in the way are afforded by the history of the Armenian massacres of 1895-6, the Cretan difficulty, and the Græco-Turkish war of 1897. See **BERLIN, TREATY OF**, and **TURKEY**.

EASTERN, or ORIENTAL, RITE, the name given to the rituals of the Armenian, Coptic, Greek, and Syrian Roman Catholics, who, acknowledging the supremacy of the pope of Rome, have been allowed to retain their own modes of performing divine worship. These differ from the Latin, not only by being in the language common among the people, but also in continuing "communion in both kinds" to the laity, and marriage to the lower clergy. Among these branches of Roman Catholics there are about 80 bishops, of whom 5 are patriarchs and 26 archbishops.

EASTERN SHORE, the counties of Accomack and Northampton in Virginia, and all of Maryland lying e. of Chesapeake bay (sometimes including Delaware also). It is a fertile region, famous for its product of peaches and garden vegetables, and equally famous for oysters. The country, though low and level, is generally healthful, and the climate is mild and equable. It is intersected by railroads, and there is abundance of steam-boat navigation. Until invaded by railroads and overrun by small owners, this was the "blue blood" section of Virginia, noted for aristocracy and hospitality.

EASTERN STATES, commonly so called, comprise the northeastern part of the United States, and go under the name of New England. There are six states in the group, namely: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut. They comprise an area of over 66,000 square miles and had in 1890 a population of 4,700,745. This region was granted to the Plymouth company by the English king, James I., in 1606, and in 1614 received the name of New England from Captain John Smith. The early settlers were Puritans, and the inhabitants are chiefly their descendants, but consist also of later English immigrants, with a mingling of Scotch. The eastern states have never suffered from the evils of pauper immigration as have the central and western parts of the country. The people have always borne the name of Yankees, and are particularly noted for their thrift and industry; while these states have been largely engaged in manufacture, they have also been a centre of learning for the whole country. The territory of the eastern states lies between 41° and 47° 32', north latitude; and 66° 52' and 73° 50' west longitude. All the states except Vermont have a coast line. The northern half of the coast is sharp and rocky; the southern half, low and sandy. The soil is in general very fertile, but of late years has been somewhat abandoned for the more inviting territory of the west. New Hampshire and Vermont have especially suffered from this tendency. The eastern states have always played an important part in the political history of the United States. Although they have furnished fewer presidents than some other parts of the country, they have had many men in congress who have won national reputations for political ability and sagacity.

EASTER OFFERINGS, or EASTER DUES, small sums paid to the parochial clergy in England by their parishioners at Easter, as a compensation for personal tithes, or the title for personal labor.

EASTER TERM, LEGAL. For a general history of the law terms in England, see **LAW TERMS**. E. T. was formerly dependent upon the movable feast of Easter, and was hence called a movable term. It commenced on the Wednesday fortnight after Easter Sunday, and lasted till the following Monday three weeks. But by 11 Geo. IV.

and 1 Will. IV. c. 70, amended by 1 Will. IV. c. 3, E. T. now begins on 15th April and ends on 8th May. If any of the days between the Thursday before and the Wednesday after Easter fall within term, no sittings in banc (q.v.) are held on those days, and the term is prolonged a corresponding number of days.

EAST FELICIANA, a parish in s.e. Louisiana, on the Mississippi and Amite rivers, reached by the Yazoo and Mississippi Valley railroad; 485 sq. m.; pop. '90, 17,903, includ. colored. It is generally level, well watered, and fertile; producing corn, cotton, rice, etc. Seat of justice, Clinton.

EAST HADDAM, a town in Middlesex co., Conn.; on the e. bank of the Connecticut river, about 16 m. from its mouth, and 30 m. below Hartford. It has manufactories of cotton, twine, lime, spoons, and German silverware. The surface is hilly; and among the hills in the n.e. part, near the river, remarkable subterraneous noises, as of rumbling and jarring, have occasionally been heard, though of late years more rarely than formerly. The sound is called "Moodus noise," from the name given to the region by the Indians, who ascribed to the sound a supernatural origin. Incorporated in 1734. Pop. '90, 2599.

EAST HAMPTON, a town in Hampshire co., Mass., on the New York, New Haven, and Hartford, and the Boston and Maine railroads, in the beautiful valley of the Connecticut, 4 m. s.w. of Northampton. Its manufactures include elastic goods, buttons, underwear, cloths and yarns. It has a public library, many schools, electric lights, public park, spring water, national and savings banks, and Williston seminary for young men, founded by Samuel Williston, and endowed with more than \$800,000. Pop. '90, 4395.

EAST HAMPTON, a town in Suffolk co., N. Y., comprising the e. end of Long Island, including the peninsula of Montauk; reached by the Long Island railroad; pop. '90, 3000. Much of the land is a narrow, sandy tract, between the ocean and the sound, of little value. The w. portion is fertile, producing fruits, vegetables, etc. The extreme e. part, known as Montauk Point, is a breezy, grassy upland, and has a noted light-house. The village of East Hampton is 7 m. s.e. of Sag Harbor. It is an agreeable and popular summer resort. The town was settled in 1649.

EAST HUMBOLDT MOUNTAINS, in Elko co., Nevada; a range with peaks 15,000 ft. high; for the most part well wooded. Fremont's pass is in this range.

EAST INDIA ARMY. When the East India company (q.v.) first sent factors or agents to India, an army was not thought of. Military forces arose out of the exigencies of the times. Some of the first troops in the company's pay were mere adventurers; some were liberated convicts; some deserters from European armies. Gradually organization was introduced, and improved arms furnished. As the power of the company increased, natives entered the battalions; until at length most of the troops were Hindus or Mohammedans, drilled by non-commissioned officers sent out from England. A few regiments were raised in England; a much larger number were raised in India; but all alike were officered by the company's favored English officers, largely paid, and having many opportunities for making rapid fortunes. The ranks were filled by enlistment; the company never compelled the natives to become soldiers; the pay offered was always such as to induce a sufficient number of men to enter. Their periods of leave of absence were liberal; and after a certain number of years' service, they retired on a pension sufficient to support them for the remainder of their days.

At the period immediately preceding the outbreak of the revolt in 1857, the army in the pay of the company comprised about 24,000 royal troops (lent to, and paid for by, the company); 18,000 European troops, raised and drilled by the company in England; 180,000 native regulars; and 60,000 native irregular horse—making about 280,000 in all. This large force was irrespective of 40,000 contingents furnished by dependent native princes, and of the native armies belonging to the independent and semi-independent princes. The company's troops formed three distinct armies, each under its own commander-in-chief, and each stationed in one particular presidency. In these three armies, three kinds of troops—Europeans, native regulars, and native irregulars—had their own special organization. In order to secure unity of action when necessary, it was customary to give the commander-in-chief of the Bengal army precedence over those of Madras and Bombay; he was, in effect, commander-in-chief of the whole of the company's forces. There were too few English officers with the native regiments, and these, in most cases, knew too little of the men under their command. This was not the cause of the revolt in 1857, but it was one of the circumstances that led to the rapid spread of the revolt when once begun. To what extent this fine army melted away during 1857 and the two following years, is described under INDIA.

In 1861, an act was passed reorganizing the Indian army. The *British* portion of it now forms part of the queen's army generally, with certain honorary distinctions, and takes its turn at home and in the colonies like the rest; but the expenses are paid out of Indian, not imperial revenues. The *native* portion is managed wholly in India; but during the eastern crisis, connected with the war between Russia and Turkey, a considerable force of native Indian troops was sent to Malta; and they were also employed in the Egyptian wars, 1882–85. On the reorganization of the Indian army in 1861

the 21st hussars, with the 105th, 106th, 107th, 108th, and 109th foot, were formed from the European troops previously in the service of the East India company.

EAST INDIA COMPANY. On the 31st Dec., 1600, a charter was granted by Queen Elizabeth to a number of London merchants, under the title of "The Governor and Company of Merchants of London trading to the East Indies." From the time when Vasco da Gama effected the eastern passage to India, by doubling the cape of Good Hope, in 1497, the Portuguese carried on an extensive trade with that country, unaffected by rivals until nearly a century afterwards, when the Dutch and the English began to compete with them. This competition became formidable when two "East India companies" were established, one at Amsterdam and one in London. It is of the latter of these that we here treat. The charter was exclusive, as is usual in such cases; prohibiting the rest of the community from trading within the limits assigned to the company. Those limits were enormous, comprising the whole space, land and sea, from the cape of Good Hope eastward to cape Horn—i.e., the whole of the Indian and Pacific oceans. The charter was for fifteen years. The company speedily sent out ships to Java and Sumatra, which returned with calicoes, silk, indigo, and spices. It was then determined to make some kind of settlements on the coast of Hindustan itself: and about 1612, the company obtained permission from the native princes to establish factories or agencies at Surat, Ahmedabad, Cambay, and Gogo.

The company's charter was renewed from time to time, with various modifications, but not without much contention and difficulty. Gradually establishments were formed in Java, Sumatra, Borneo, Celebes, Malacca, Siam, the Banda islands, and other places in the east; as well as on the Coromandel and Malabar coasts of India itself. The first beginning of Madras dates in 1640, of Calcutta in 1645, and of Bombay in 1665, as chief establishments of the company. In 1662, Charles II. gave them permission "to make war and peace on the native princes"—a privilege of which they largely availed themselves for nearly 200 years.

In 1698, the crown granted a charter to a *new* E. I. C., who offered a loan of £2,000,000 to the state; but this naturally led to wranglings, and the two companies were united into one by an act of parliament passed in 1702. The constitution then established was maintained with little alteration as long as the company existed. Every shareholder who held £500 of the company's stock became a member of the court of proprietors, and this court had legislative functions in all that related to the company's affairs. The proprietors annually chose 24 to form a court of directors, from those of their number who held not less than £2,000 of stock. Six of the directors went out of office every year; they retired in rotation, so that each had four years of office. It was a general custom with the proprietors to elect the same persons as directors over and over again. The court of proprietors was to meet once a year, or oftener if necessary; the court of directors as often as the directors chose, provided 13 were present. Theoretically, the constitution of the company was very democratic; but practically the affairs were in the hands of the directors; for the proprietors took little other interest than in receiving their half-yearly dividends. The proprietors had from one to four votes each, according to the amount of stock held by them. The board of control, of later formation, bore relation to the governmental affairs of India.

Properly speaking, the company were only merchants: sending out bullion, lead, quicksilver, woollens, hardware, and other goods to India; and bringing home calicoes, silk, diamonds, tea, porcelain, pepper, drugs, saltpeter, etc., from thence. Not merely with India, but with China and other parts of the east, the trade was monopolized by the company; and hence arose their great trade in China tea, porcelain, and silk. By degrees, avarice and ambition led the company, or their agents in India, to take part in the quarrels among the native princes; this course gave them power and influence at the native courts, from whence arose the acquisition of sovereign powers over vast regions. India thus became valued by the company, not only as commercially profitable, but as affording to the friends and relations of the directors opportunities of making vast fortunes by political or military enterprises. It is not the purpose of the present article to trace the political affairs of the company, or the rise of a British empire in India; that will be done under *INDIA, BRITISH*; it will suffice here merely to state, that no *national* or *patriotic* motive marked the beginning of this course.

In 1744, the company obtained a renewal of their charter till 1780, but not without a loan of £1,000,000 to government; for the monopoly was distasteful to the nation at large. France, too, had an E. I. C., and the struggles between the two companies for power in the southern part of India, led to constant warfare between them during the remainder of the century. Other loans to government were the means of obtaining further renewals of the charter in later years. In 1833, the legislature took away all the *trading* privileges of the company. The dividends to proprietors of East India stock were thenceforward to be paid out of taxes imposed by the company on the people of India, in such provinces as were under British dominion. From that year the company's powers became anomalous; the company could not *trade*, and could not *govern* without the sanction and continued interference of the imperial government. The wars in India, since that year, have been waged by England as a nation, rather than by the company; and England practically, though not nominally, became responsible for the

enormous cost of those wars. In 1853, the charter was again renewed, with a further lessening of the power of the company, and an increase of that of the crown.

Had not the Indian revolt occurred in 1857, the last charter would have remained in force until 1873; but that gigantic calamity led to the resolution—a resolution the wisdom of which was disputed by many of the best judges of Indian affairs—of concentrating the power in the hands of the imperial government. In spite of a strenuous resistance, in 1858, the company were forced to cede their powers, by an act which received the royal assent on the 2d of August. The charter of 1853 had provided that £6,000,000 of India stock should have 10½ per cent dividend *guaranteed* by England out of the revenues of India; and that parliament should redeem this stock at cent per cent premium any time after the year 1873. The act of 1858, therefore, contained due clauses for carrying out these provisions, and transferred the whole of the company's powers to the crown.

The company continued to exist, but for little other purpose than that of receiving and distributing dividends. Most of the distinguished men, military and political, till then in the company's service, accepted office under the crown, to assist the government by their general knowledge of Indian affairs. These affairs are now managed by a secretary in council at the new India office. The valuable library and museum of the company have passed over to the crown; and an act of parliament (1873) provides for the paying off of the India stock and the final extinction of the East India company.

EAST INDIES, as distinguished from *West Indies*, include not merely the two great peninsulas of southern Asia, but likewise all the adjacent islands from the delta of the Indus to the northern extremity of the Philippines. They thus extend, to use round numbers, in lat. from 35° n. to 10° s., and in e. long. from 65° to 130°. At one time, the name of India had, towards the e., a still wider application, occasionally comprising Japan, nay, everything in that direction except China alone. See **INDIA**.

EASTLAKE, Sir CHARLES LOCK, president of the royal academy of London, was b. at Plymouth in 1793, educated at the Charter-House in London, and entered as a student at the royal academy. Subsequently, he went to Paris, where he studied and copied the great paintings then collected in the Louvre. The return of Napoleon from Elba compelled him to leave France. He went back to his native town, and supported himself by portrait-painting. When the *Bellerophon*, with Napoleon on board, appeared in the port of Plymouth, E. profited by the opportunity, and produced his first important picture, "Napoleon at the Gangway of the *Bellerophon*, attended by some of his Officers." In 1817, sir Charles visited Italy and Greece, sketching assiduously in both countries. During a residence of several years in Rome, he executed his "Girl of Albano leading a Blind Woman to Mass," "Isidas the Spartan," "Pilgrims arriving in Sight of Rome," and many others, illustrative of Italian customs and scenery. In 1827, he was elected an associate, and in 1830, a full member of the royal academy. His "Greek Fugitives Prisoners to Banditti," etc., added to his already great reputation; and in 1841, appeared what many conceive to be his masterpiece, "Christ lamenting over Jerusalem." It was immensely admired, the duplicate painted for Mr. Vernon being reckoned one of the most valuable pictures in the Vernon gallery. "Hagar and Ishmael" was exhibited in 1844; "Heloise" in 1845; "The Escape of Francesco Novello di Carrara with Taddea d'Este, his Wife, from the Duke of Milan," in 1850; "Beatrice" in 1855, etc. In 1850, he was elected president of the royal academy, when he received the honor of knighthood. Subsequently, he was appointed director of the national gallery, in which capacity his services were of the highest importance; for besides its improved arrangement, many of the most valuable specimens of the best schools were added to the collection. Sir Charles also acquired a high reputation as a writer on art. In 1847, he published *Materials for the History of Oil Painting*, a work of great learning and research. He contributed several articles to the *Penny Cyclopædia* on subjects belonging to his profession, and executed a translation of Goethe's *Farbenlehre*. In 1853, he received the title of D.C.L. from the university of Oxford. He died Dec., 1865.—**LADY EASTLAKE** (b. Elizabeth Rigby) is an artist of high reputation, and has distinguished herself as an authoress by her *Letters from the Baltic*; *Livonian Tales*; and her articles on subjects connected with art in the *Quarterly Review*.

EASTLAND, a co. in n.w. Texas, on Leon river; 909 sq. m.; pop. '90, 10,373. Cattle raising is the chief industry, but the soil is highly productive. Co. seat, Eastland.

EAST LIVERPOOL, a city in Columbiana co., O., on the Ohio river, and the Cleveland and Pittsburg railroad, 44 miles w. of Pittsburg. Extensive manufactories of pottery, china, and parian ware, and foundries and glass works are among the leading industries. The city has a public library, electric lights and street railroads, improved waterworks, national and savings banks, business college, and a bridge across the Ohio river. Pop. '90, 10,956.

EAST MAIN, formerly a portion of the Hudson bay territories, now incorporated in the dominion of Canada, is bounded n. by Hudson's strait, and w. by Hudson's bay down to its southern extremity, meeting Labrador on the e. and Canada on the south. This immense region, thrice as large as Great Britain, is generally bleak and sterile, yielding little to commerce but fish-oil and a few furs.—A river of the same name, otherwise called the *Slade*, crosses its southern section, entering Hudson's bay, here known as James's bay, about lat. 52° 15' n., after a course of 400 miles.

EASTMAN, HARVEY GRIDLEY, 1832-78; b. Marshall, N. Y. He was the founder of the Eastman national business college, at Poughkeepsie, N. Y., which, starting with one pupil in 1859, became highly prosperous. He served in the N. Y. assembly, 1871 and 1873, and was thrice mayor of Poughkeepsie.

EASTMAN, MARY HENDERSON, b. Va., 1818; daughter of Dr. Thomas Henderson, and wife of Capt. Seth Eastman, of the U. S. army. He was stationed for several years in the Indian country, where his wife wrote *Dakotah, or Life and Legends of the Sioux*; *Romance of Indian Life*; and other works of the kind. In 1852 she published *Aunt Phillis's Cabin*, in response to Mrs. Stowe's famous *Uncle Tom's Cabin*. She has also published the *American Aboriginal Portfolio* and *Chicora and other Regions of the Conquerors and the Conquered*.

EASTON, city and co. seat of Northampton co., Pa.; on the Delaware and Lehigh rivers, the Morris and Essex and Lehigh canals, and the Lehigh Valley, Central of New Jersey, the Delaware, Lackawanna, and Western, the Bangor and Portland, and the Lehigh and Hudson railroads; 57 miles n. of Philadelphia. It has unlimited water-power and manufactories, including railroad switch and signal works, drill works, car seat and railroad supply factories, hosiery mill, chemical works, tannery, and the shops of the Lehigh Valley railroad. The city is supplied with water from the Delaware river and there are electric lights and street railroads, several national banks, public library, hospital, old ladies and children's homes, and daily and weekly newspapers. It is the seat of Lafayette college (q. v.). Pop. '90, 14,481.

EASTON, JAMES, b. Conn. He was a col. in the revolutionary army, raising a regiment by his own exertions, and spent his entire fortune for the service. He was one of the leaders in the capture of Ticonderoga, and brought the news of the victory to the provincial congress. He was also with Montgomery in the invasion of Canada. In Jan. 1776, he received the thanks of congress, but was forced, through the enmity or jealousy of Benedict Arnold, to quit the service in that year.

EASTON, NICHOLAS, b. Wales, 1593; d. R. I., 1675. He went to Massachusetts, 1634; in 1638 he removed to Rhode Island, and built the first house in Newport. He was governor of the colony in 1650. His son John was governor in 1690-95, and was the author of a *Narrative of the Causes which led to King Philip's War*.

EAST ORANGE, a town in Essex co., N. J., on the Delaware, Lackawanna and Western railroad, and an electric railroad connecting with Orange and Newark; 2 miles n.w. of Newark. It is growing rapidly; and has an intelligent and thriving population, being the residence of a large number of people doing business in New York. It has churches, high and graded schools, banks, public hall, good water and sewerage, a weekly newspaper, and numerous handsome residences. The principal streets are macadamized; many of them are bordered with fine shade-trees, and lighted by electricity. Pop. '90, 13,282.

EASTPORT, city and port of entry in Washington co., Me., on Moose island in Passamaquoddy bay, which receives the St. Croix river, the international boundary during its whole course between the United States and Dominion of Canada. On the coast, H. may be said to be the frontier city of the union towards the n.e. Its harbor is deep enough for the largest vessels. The tide rises within it to a height of 25 ft.—a height far exceeded in many other parts of the bay of Fundy, of which Passamaquoddy bay is an inlet. It has a high school, public library, national and savings banks, several churches, electric lights, weekly newspaper, and large fishing and sardine canning interests. Pop. '90, 4908.

EAST PORTLAND, a former city of Multnomah co., Ore., on the Willamette river, opposite Portland. In 1893, East Portland and Albina were consolidated with Portland (q. v.).

EAST PROVIDENCE, a town in Providence co., R. I., separated from the city of Providence by the Blackstone river. It is on the New York, New Haven, and Hartford railroad and an electric line to Providence. On the w. side of the town are the Pawtucket river and Narragansett bay. It contains two villages, Watchemoket and Rumford, and several schools, churches, and chemical works. Pop. '90, 8422.

EAST RIVER, the strait between Long Island sound and New York harbor. It is 20 m. long, separating New York city on the w. from its suburbs, Williamsburg and Brooklyn, on the east. Its narrowest part is the Hurlgate or Hellgate, which is about the middle of its course. Here the rocks which once obstructed the passage have been removed by blasting. The name—clearly a misnomer for an arm of the sea—is convenient as contrasted with the North river, or Hudson, and may have arisen from the river-like action of the tides—an action so powerful as to have here and there materially deepened the channel.

EAST SAGINAW, a former city in Saginaw co., Mich.; consolidated with Saginaw (q. v.) in 1890.

EATON, a co. in s. Michigan, on Grand river, intersected by the Chicago and Grand Trunk, and the Michigan Central railroads; 580 sq. m.; pop. '90, 32,094. The surface is undulating, and the soil productive. Wheat, corn, barley, maple sugar, butter, and wool are the chief staples. Co. seat, Charlotte.

EATON, AMOS, 1776-1842; b. N. Y.; graduated at Williams college in 1799, and became a lawyer and surveyor at Catskill, N. Y. He studied natural sciences and lectured on botany, chemistry, geology, and mineralogy, and with Drs. T. Romeyn Beck and Lewis C. Beck he made a geological survey of Albany and Rensselaer counties. In 1820 he was professor of natural history in the medical college at Castleton, Vt. In 1824 he was at the head of the Rensselaer school of science in Troy. He published many works on botany, chemistry, geology, natural history, and agriculture.

EATON, AMOS BEEBE, 1806-77; b. N. Y.; graduated at West Point, 1826, and entered the army as officer of infantry. After service on the northern frontier, he was transferred, in 1838, to the department of subsistence, and served as commissary in Florida, on the Canada border, and in New York. In the Mexican war he was chief commissary under maj.-gen. Taylor, and in 1851-55 he was in the department of the Pacific. During the civil war he was depot purchasing commissary at New York city, for the armies in the field, and after 1864 was commissary-general of subsistence at Washington. He was made brevet maj. gen. for meritorious and distinguished services.

EATON, CHARLES HENRY, b. Worcester, Mass., 1851; son of the Rev. Henry A.; adopted in childhood by E. D. Draper, of Roxbury. He graduated at Tufts coll. 1877; preached at So. Berwick, Me.; was ordained pastor of the Universalist church, 1877; was called, 1881, to the church of the Divine Paternity, New York.

EATON, DANIEL CADY, American botanist, son of Amos B. Eaton; born at Fort Gratiot, Mich., in 1834; graduated at Yale in 1857, and at Lawrence Scientific School (Harvard) in 1860; became professor of botany at Yale in 1864. He contributed to *Gray's Manual*, and to Chapman's *Flora of the Southern States*, the parts relating to ferns, and published *The Ferns of North America* (1879-80). Died June 29, 1895.

EATON, DORMAN BRIDGMAN, b. Vt., 1823; graduated at the univ. of Vermont and at the Harvard law school; and began the practice of law in New York, 1850. He has given much attention to political and municipal affairs, and has been largely engaged in civil service reform. At the request of Pres. Hayes he wrote a historical report on the *Civil Service in Great Britain*, 1879. He was the author of the law creating the board of health of New York, and of the national civil service act of 1883, and was a commissioner under the act in 1883-5.

EATON, EDWARD DWIGHT, educator; b. Lancaster, Wis., Jan. 12, 1851; graduated at Beloit college in 1872, and at the Yale theological seminary in 1875; studied at the universities of Leipzig and Heidelberg; held a Congregational pastorate at Oak Park, Ill., in 1880-86; and was elected president of Beloit college, Wis., in the last year.

EATON, GEORGE WASHINGTON, D.D., LL.D., 1804-72; b. Penn.; Baptist clergyman, educated in Ohio university and Union college, tutor in the last named institution in 1829. In 1831 he was professor of ancient languages in Georgetown (Ky.) college; 1832-50, professor of mathematics, natural philosophy, and ecclesiastical and civil history in the literary and theological institution at Hamilton, N. Y.; afterwards at the same place professor of systematic theology; 1856-68, president of Madison university; also, 1861-71, president of the theological institution.

EATON, JOHN, JR., LL.D., b. N. H., 1829; graduated at Dartmouth in 1854, studied theology at Andover theological seminary; ordained by the Maumee (O.) presbytery, 1861; commissioned chaplain of the 27th Ohio volunteers, 1861; appointed by Gen. Grant superintendent of contrabands, 1862; general superintendent of freedmen for Mississippi, Arkansas, w. Tennessee, n. Louisiana, 1862, serving till May, 1865. He was commissioned col. of the 63d colored troops, 1863; breveted brig. gen. of volunteers, 1865; assistant commissioner of the bureau of refugees, freedmen, and abandoned lands, 1865; state superintendent of public instruction for Tennessee, 1867-69; U. S. commissioner of education, 1870-85; president of Marietta college, 1885-91. He published many reports, chiefly upon education and public affairs; and established and edited, 1866-70, the *Memphis Daily Post*.

EATON, MARGARET L., 1796-1879; the wife of John Henry Eaton, sec. of war under Pres. Jackson. Pres. Jackson demanded of his cabinet a public recognition of Mrs. E., which was refused by all except Van Buren, sec. of state. The president then requested Van Buren to resign, and appointed him minister to England; but owing to Calhoun's opposition, the senate failed to confirm him. Mrs. E. was, in later years, brilliantly successful in society in London, Paris, and in Madrid, where her husband was stationed as minister to Spain. After the death of Gen. Eaton she married an Italian teacher. Her last years were spent in seclusion at Washington.

EATON, THEOPHILUS, about 1591-1658; b. Oxfordshire, England; became a merchant; went to New England in 1637; was chosen a magistrate in Massachusetts; aided in settling a colony at Quinnipiac in 1638 and in forming the government of the New Haven colony in 1639; and was governor of the colony till his death.

EATON, WILLIAM, 1764-1811; b. Conn.; at 16 years of age entered the revolutionary army and served through the war. Entering Dartmouth college, he graduated in 1790, and in 1792 was made a capt. in the regular army; in 1797 sent as diplomatic agent to Tunis, where he succeeded in putting an end to the outrages of the corsairs of that country upon American ships. In 1803 he returned, but the next year went back as navy agent of our government for the Barbary states. There was at the time a contest for the throne of Tripoli, with which country this nation was at war. Eaton found that the rightful bey, or ruler, had taken refuge in Egypt. He went to him, assisted in raising a force of 500 men, marched 600 m. over the Libyan desert, secured the assistance of the American fleet, and captured Derne after a furious assault, in which he was wounded. The reigning bey came against him and desultory warfare followed. June 11, 1804, a general engagement took place, and the usurping bey was defeated. Eaton was about to march to Tripoli, install the rightful ruler, and release a large number of American captives, when news arrived that peace with Tripoli had been concluded by the American consul at Algiers. This put an end to his work, and he returned home. He settled in Mass., whose legislature gave him 10,000 acres of land, and later he was elected to the legislature. In 1806 Aaron Burr tried to engage him in the south-western conspiracy, but without success, and on Burr's trial Eaton was a witness against him.

EATON, WILLIAM WALLACE, b. Conn., 1816; engaged in the practice of law; was a member of the house of representatives for nine sessions; speaker of the house, 1853 and 1873; in state senate, 1850; was elected to the U. S. senate as a democrat, 1874; and was elected representative to the XLVIIIth congress, 1882. He was known as a vigorous party leader in both state and national politics.

EATON, WYATT, b. Canada, 1849; studied under Gérôme in Paris; for some years occupied a studio in New York, devoting himself to landscape and portrait painting. He was the first sec. of the society of American artists, and to their exhibition he sent his portrait of William Cullen Bryant, 1878. Among his paintings are "Reverie," and "Harvesters at Rest." He d. in 1896.

EATON HALL, one of the famous "show-places" of England, the residence of the Duke of Westminster, a descendant of Hugh Lupus, and the richest peer in England. It is beautifully situated on the river Dee, $3\frac{1}{2}$ miles from Chester, whence a small steamer leaves daily for Eaton hall. The hall, which is the fourth on the site, is purely modern, erected 1870-82 by the architect Waterhouse. It is a remarkably fine specimen of Gothic architecture, and is adorned with all the resources of modern art and fitted up with the most lavish expenditure. A well-timbered park, stocked with herds of deer, surrounds it, and gardens and terraces of much beauty are open to the visitor, as is also the stud-farm, which contains several famous racers, such as Bend Or and Shotover. The park is very extensive, the mansion being nearly three miles from the lodge gates. Some fine paintings are exhibited in the various apartments, among them specimens of Rubens, Benjamin West, and Millais. Eaton hall is annually visited by many Americans, and is in many ways a typical modern English aristocratic mansion.

EATON RAPIDS, a city in Eaton co., Mich.; on the Lake Shore and Michigan Southern railroad, 100 miles w. of Detroit. It has banks, churches, newspapers, machine-shops, woolen and lumber mills, flour mills, plow works, fruit evaporator, and large bean picking and shipping plants. There are several noted chalybeate springs here. Pop. '90, 1970.

EATONTOWN, a town in Monmouth co., N. J., on the New Jersey Central railroad, 4 miles w. of Long Branch, 30 miles from New York. It has several churches, public schools, flour mill, tomato works, hat factory, electric lights and railroad connecting with Atlantic Highlands, Red Bank, and Long Branch, and the Monmouth Park race track. Pop. '90, 2953.

EAU CLAIRE, a co. in w. Wisconsin, on Chippewa and Eau Claire rivers; 648 sq. m.; pop. '90, 30,673. The surface is uneven, and the soil fertile; principal productions, wheat, corn, oats, and butter. Co. seat, Eau Claire.

EAU CLAIRE, a city and co. seat of Eau Claire co., Wis., at the junction of the Eau Claire and Chippewa rivers, and at the head of steamboat navigation on the latter; on the Wisconsin Central and other railroads, 90 m. from St. Paul. It is the chief commercial point in n.w. Wisconsin; is the outlet of the Chippewa lumber district; has good water-power from both streams, and manufactures over 300,000,000 ft. of lumber annually. There are iron foundries, a linen mill, and manufactories of furniture, refrigerators, sashes and doors, shoes, and electrical machinery and appliances. The city has electric railroads, water-works, public parks, opera-house, a public library, high school, Sacred Heart hospital, national and other banks, and daily and weekly newspapers. Pop. '80, 10,119; '90, 17,451.

EAU DE COLOGNE, a celebrated perfume, invented long ago by the Farina family in Cologne, and since manufactured chiefly by members of the same family; but perfumes bearing the same name are now made in various parts of the world. It consists principally of spirits of wine, along with numerous essential oils harmoniously mingled together, so as to produce a refreshing and grateful scent. The recipe said to be followed in the manufactories at Cologne is twelve drops of each of the essential oils—neroli, citron, bergamot, orange, and rosemary, along with one dram of Malabar cardamoms, and one gallon rectified spirit. The whole is distilled together, and the condensed liquid constitutes Eau de Cologne.

EAU CRÉOLE, a very fine liqueur, made in Martinique, by distilling the flowers of the mamee apple (*mammea Americana*) with spirit of wine.

EAU DE JAVELLE is a solution of hypochlorite of potash, which, when administered to man, is stated to act powerfully on the nervous system, and to give rise to general rigidity, and even to cause tetanic spasms.

EAU DE LUCE is the name given to a preparation which was formerly a very popular stimulant, and is still occasionally used. It is a mixture of oil of amber with alcohol and ammonia, and has a milky appearance. It had a great reputation in cases of snake-bites.

EAU DE VIE. See BRANDY.

EAU FORTE. See AQUA FORTIS.

EAUX BONNES, a fashionable watering-place of France, in the department of Basses-Pyrénées, is situated 20 m. s.e. of Oloron. It stands in a narrow gorge surrounded with rocks, and consists of a street of about 30 large and well-built hotels and lodging-houses. On the opposite side of the street there is an open space laid out as a shrubbery and planted with trees; it is called the Jardin Anglais. E. B. is much frequented on account of its hot sulphureous springs, which are four in number, and are used for bathing purposes. Their temperature does not exceed 91° F. There is also a cold spring here, which is used for drinking. The springs are said to be very valuable, on account of their power of checking the progress of incipient consumption, and of curing various affections of the lungs and chest. The season of the E. B. lasts from June to Oct., and during that time it is crowded with visitors and patients. Permanent pop. '91, 735.

EAUX CHAUDES, LES, 3 m. s.w. of the preceding, is a similar place of resort. Its springs have the same properties as those of the Eaux Bonnes.

EAVES, in architecture, the edge of a sloping roof which overhangs the wall, for the purpose of throwing off the water. When there is no concealed gutter at the margin to conduct the water to spouts or pipes, but the water is allowed to run from the roof to the ground, they are called *dripping eaves*.

EAVESDRIIP, or **EAVESDROP** (Ang.-Sax. *yfesdrype*). "The owner of a private estate," says Kemble (*Saxons in England*, vol. i. p. 45), "was not allowed to build or cultivate to the extremity of his own possession, but must leave a space for eaves. The name for this custom was *yfesdrype*." The space was regulated by the charter by which the property was held. In a charter of 868 A.D., it is limited to 2 feet. This Saxon custom corresponded to the well-known urban servitude of the Romans called *stillicide* (*stillidium*). The eavesdrop was the water which dropped from the projecting roof, and in this sense is opposed to the water collected in a spout, to which the Romans gave the name of *flumen*. Similar regulations existed in Greece, and have probably existed in all countries.

EAVES-DROPPERS "are such as listen under walls or windows, or the eaves of houses, to hearken after discourse, and thereupon to frame slanderous or mischievous tales."—Blackstone's *Comm.* iv. 163. Such persons are, by the law of England, regarded as common nuisances; they may be indicted at the sessions, and on conviction are punishable by fine. Persons who by their conduct expose themselves to suspicion of an intention to commit this offense, may be brought before a magistrate, and required to give security for their good behavior; 34 Edw. III. c. 1.

EBAL AND GERIZIM. See GERIZIM AND EBAL.

EBB AND FLOW. See TIDES.

E'BELING, CHRISTOPH DANIEL, 1741–1817; b. Hanover. He was famous for extensive knowledge of oriental languages, classic literature, and geography and history. The congress of the United States gave him a vote of thanks for his *History and Geography of North America*. He made a collection of about 4000 books and 10,000 maps relating to America, which is now in the library of Harvard university.

EBENA'CEÆ, a natural order of exogenous plants, consisting of trees and shrubs, with alternate leathery leaves, and axillary flowers, which are monopetalous, somewhat leathery, and generally unisexual; the fruit fleshy. They have not a milky juice. They are regarded as allied to *aquifoliaceæ* (holly, etc.), *apocynaceæ*, and *oleaceæ*. About 160 species are known, mostly tropical, but a few are natives of Europe, and other temperate countries. The wood is in general remarkable for its hardness, as the different kinds of ebony (q.v.) and other species of *diospyros*; and on account of this quality, even that of species which never attain the ordinary size of timber trees is sometimes

accounted valuable, as of *royena lucida*, the African bladder-nut or zwart-bast, at the cape of Good Hope; where also that of *euclea undulata*, a hard brown wood, is esteemed for cabinet-work. The fruit of many species is eatable. See DATE PLUM. The fruit of *embryopteris gelatinifera* contains a viscid juice, and is used in all parts of India for paying boats.

EBENEZER, the name of a place marked by a monumental stone set up by Samuel in recognition of divine assistance in a battle with the Philistines. Its location cannot be satisfactorily determined. The name means "Stone of the help."

EBERHARD, AUG. GOTTLOB, a well-known German author, was b. at Belzig, in 1769, studied at Leipsic and Halle, and first attracted attention by his contributions to a periodical devoted to *belles-lettres*, entitled *Ida's Blumenkörbchen* (Ida's Flower-basket). Among his numerous works may be mentioned *List um List, oder was ein Kuss nicht vermag* (Trick for Trick, or what could not a Kiss do); *Ysop Lafleur's Sämmtliche Werke* (Ysop Lafleur's Collected Works); *Ferdinand Werner, der Arme Flötenspieler* (Ferdinand Werner, the poor Flute-player); and *Ischarioth Krall's Lehren und Thaten* (Ischariot Krall's Doctrines and Doings); *Hännchen und die Küchlein* (Jenny and the Chickens), a narrative poem in ten parts, which has gone through many editions, and been often translated into other languages; and *Der erste Mensch und die Erde* (The First Man and the Earth), a poem marked by simple dignity and lively representation. E., after a life of hard literary work, died at Dresden, 18th May, 1845.

EBERHARD, IM BART (Ger., with the beard), Count, and afterwards first duke of Württemberg; 1445-96; the second son of count Ludwig I. He succeeded his elder brother, Ludwig II., at the age of 12, and before he was 14 wrested the government from his uncle Ulrich, who had been appointed his guardian. His tutor was the learned John Naclerus, but Eberhard profited little by his learning, indulged his passions, and led a dissipated life. In 1468, he made a pilgrimage to Jerusalem, after which he abandoned his reckless mode of living, and became one of the most popular princes of Germany. He married Barbara, daughter of Lodovico di Gonzaga, whose influence over him contributed largely to the elevation of his character. He began to study, gathering around him men of learning; and at the solicitation of his wife founded in 1477 the university of Tübingen. In 1482, Eberhard, by the treaty of Minzingen, put an end to the evils which had arisen from a division of the county made in 1437 between his father and his uncle Ulrich, as representatives of the two lines of Urach and Stuttgart. By this treaty he secured the future indivisibility of Württemberg and the right of primogeniture in his own family; he became at the same time the founder of the representative constitution of Württemberg. He made Stuttgart his place of residence, and improved the laws and condition of the convents in his country. Though a lover of peace, he knew how to bear the sword when war was necessary; and by his courage and fidelity to his engagements secured the esteem and friendship of the emperors Frederick III. and Maximilian I. In recognition of his services, the emperor at his first diet, held at Worms in 1495, raised Eberhard to the dignity of duke, confirming at the same time all the possessions and prerogatives of his house; but Eberhard did not long enjoy his new dignity. His two children died in infancy, and with his death the line of Urach became extinct.

EBERHARD, JOHANN AUGUST, a philosophical writer of Germany, was b. at Halberstadt, 31st Aug., 1739; studied theology at Halle, 1756-59; and after spending several years as a preacher in Berlin and Charlottenburg, became professor of philosophy at Halle in 1778, and doctor of theology in 1808. He died 6th Jan., 1809. E.'s first work was his *Neue Apologie des Socrates* (New Apology of Socrates), 2 vols., Berlin, 1772; a work in which the rights of common sense are vindicated against the accusations of a narrow theology. It was received with much applause both in Germany and in other countries. Among his other writings may be mentioned *Sittenlehre der Vernunft* (Ethics of the Reason), Berlin, 1781; *Theorie der schönen Künste und Wissenschaften* (Theory of the Fine Arts and Sciences), Halle, 1783; *Allgemeine Geschichte der Philosophie* (Universal History of Philosophy), Halle, 1788; *Handbuch der Aesthetik* (Manual of Æsthetics), 4 vols., Halle, 1803-5; and *Versuche inder allgemeinen Deutschen Synonymik* (An Attempt towards a Complete Work on German Synonyms), 6 vols., Halle, 1795-1802, a work which was enriched and improved by Maas, 1818-21, and again by Gruber, 1826-30, but which was, at the time of its appearance, the best thing of the kind in the German language. Towards the close of his life, E. struggled, but without success, against the speculative excesses of the new schools of philosophy headed by Kant and Fichte. E. was a clear and sensible thinker, as well as an agreeable and interesting writer.

EBERHARD, KONRAD, 1768-1859; b. Bavaria; studied in Munich and Rome; sculptor and painter; became professor of sculpture in the Munich academy of fine arts. Many of his paintings illustrate the progress and triumphs of Christianity. Of his sculptures, the best known are the statues of St. Michael and St. George at the Isargate, Munich; and the tomb of the princess Caroline.

EBERNBURG, a small t. in the Bavarian palatinate, is situated about 20 m. s.w. of Mayence, at the junction of the Alsenz with the Nahe. It is notable on account of the ruins of its castle, which formerly belonged to the famous knight Franz of Sickingen,

who was a devoted friend of the early reformers. His stronghold, which was once considered almost impregnable, afforded a secure retreat from danger and persecution to Melancthon, Bucer, Ecolampadius, and Ulrich von Hutten, the last of whom composed several of his works here. After the death of Sickingen, the castle of E. was besieged and dismantled by the electors of Hesse and Treves.

EBERS, GEORG MORITZ, b. Berlin, 1837; studied at Göttingen and Berlin; taught in the university of Jena; and became professor of Egyptology in Leipzig University in 1870. He paid especial attention to Egyptian archaeology; discovered in Egypt in 1872-3 the papyrus since named after him; and published *An Egyptian Princess; Egypt and the Books of Moses; Through Goshen to Sinai; Uarda; Homo Sum; The Sisters; Margery; The Story of my Life; Per Aspera; Cleopatra* (1894); *In the Fire of the Forge* (1895); *In the Blue Pike* (1896), etc.

EBERT, KARL EGON, a Bohemian poet, was b. at Prague, 5th June, 1801; was educated there and at Vienna; and after filling several situations, settled in Prague. The honor of knighthood was conferred on him in 1871. His chief works are his *Dichtungen* (2 vols., 1824; 3d ed., 1845); *Wlasta, ein Böhmisches nationales Heldengedicht in drei Büchern* (Wlasta, a Bohemian National Heroic Poem, in three books), Prag. 1829; and *Das Kloster, idyllische Erzählung in fünf Gesängen* (The Cloister, a Narrative Idyl, in five cantos), Stutt. 1833. These poems, especially the last two, are marked by lyrical vehemence, and elegance of language. They were received with applause, particularly in Bohemia, whose national traditions form their ground-work. E.'s compositions show a happy union of the German and Czech characteristics. He likewise wrote a large number of dramas, of which *Das Gelübde* (The Vow, 1864) was received with public favor at Prague. He has also published some meritorious lyrical poetry; d. 1882.

E BIONITES (Heb. *ebion*, poor), a name probably given originally by the hierarchical or influential party among the Jews, to those of their countrymen who professed the Christian faith, and who generally belonged to the poorer and more ignorant class (John, chap. vii., verses 48, 49). Subsequently, it would seem, the Gentile Christians, who were ignorant of Hebrew, employed it in a distinctive sense to designate their Jewish co-religionists, who, in addition to their belief of Christianity, observed the Mosaic law. Irenæus is the first writer who makes use of the name. It is highly probable that the E. first became an organized body or sect at Pella, a city in Peræa, on the eastern side of the Jordan, whither they had betaken themselves on the breaking out of the Roman-Jewish war in the time of Hadrian. Here, indeed, a strictly Jewish-Christian church continued to exist down to the 5th century. Among the E., however, there was by no means a unanimity of religious feeling, or uniformity of opinion. Two great divergent parties are clearly recognizable—the E. proper, and the Ebionitic Nazarenes. The former were little different from Jews: their conceptions of the Saviour were meager and unspiritual. They believed that Jesus was simply a man distinguished above all others for legal piety—pre-eminently a Jew, and selected as the Messiah because of his superior Judaism. Of course they denied his supernatural birth, yet not his resurrection; for “they lived in expectation of his speedy return to restore this city of God (Jerusalem), and to re-establish the theocracy there in surpassing splendor.”—Neander. They were the genuine descendants of those Judaizers who plagued the church in the time of the apostle Paul. The Ebionitic Nazarenes, on the other hand (who at the close of the 4th c. seem to have dwelt chiefly about Beroæa in Lower Syria, but at an earlier period may have been more widely diffused), were Jewish Christians, in the better sense of the term. They conceived it to be their *own* duty still to circumcise, keep the Sabbath, etc., but they had no wish to impose the peculiarities of Judaism on the Gentile Christians. They did not believe that Christianity was merely a glorification of Judaism, but a new life come into the world, in which the Gentile might at once participate, without undergoing a Mosaic ordeal. Like the stricter E., they used a *Gospel of Matthew*; but it contained what the other did not—an account of the supernatural conception and birth of the Saviour. According to Neander, who has very thoroughly investigated this question, there were a great many varieties of opinion among the E., springing out of the differences above spoken of, which it would be tedious to record. It is sufficient to say that *Essenism* modified Ebionism greatly, through the introduction of a Jewish mysticism, which recognized in Moses and Christ an inward identity of doctrine, and regarded them as revealers of the “primal religion,” whose teaching, however, had been sadly corrupted. See CLEMENS, TITUS FLAVIUS; ESSENES.

EBLIS, in the Mohammedan religion, the chief of the fallen angels, the angel of “despair” (Eblis), who was once a good angel named Azazil, but having refused to render homage to Adam, was banished by God to wander over the earth until the resurrection.

EB'OLI (ancient *Eburæ*), a small t. of southern Italy, in the Principato Citeriore, about 16 m. e.s.e. from Salerno, is picturesquely situated at a considerable elevation above sea-level. The climate, which does not become too cold in winter, notwithstanding the position of the town, is very unhealthy in summer, owing to the number of streams in the neighborhood. Pop. est. at over 9000.

EBONY (Lat. *ebenum*; but originally from the eastern name), a wood remarkable for its hardness, heaviness, and deep black color, is the heart-wood of different species of

diospyros, of the natural order *ebenaceæ*, the same genus which produces the date plum (q.v.), kaki, and other fruits. The best E., excelling in uniformity and intensity of color, is the produce of *D. ebenum*, which grows in great abundance in some of the flat parts of Ceylon, and is a tree of such magnitude, that logs of its heart-wood, 2 ft. in diameter, and varying from 10 to 15 ft. in length, are easily procured. *D. melanoxylon*, the E. tree of Coromandel, yields E. of good quality; *D. tomentosa*, *D. roylei*, and other Indian species, also yield it. In Mauritius and Madagascar, E. of very good quality is produced by *D. reticulata*. Other species of *diospyros* are much valued for their beautiful timber, very different in color from E., as calamander wood (q.v.) and cadooberia (*diospyros ebenaster*). The last-named species is found in India and Ceylon. The prevailing black of the wood is beautifully striped with a rich yellowish-brown; but in density and durability it is far inferior to ebony.—E. is chiefly used by cabinet-makers for veneering. The ancient Greeks and Romans were acquainted with it; and it is supposed that they obtained it either from India or Madagascar. They frequently inlaid it with ivory, for contrast of color. It is mentioned by Ezekiel (xxvii. 15) as an article of Tyrian commerce. It was at one time used in medicine, as a laxative and sudorific; it has a somewhat pungent taste.—The name E. is sometimes given to the black wood of trees very different from those of the genus *diospyros*. An Abyssinian tree called mozzungha (*fornasinia*), of the order *leguminosæ*, produces a black heavy wood, much resembling ebony.—WEST INDIAN E. or AMERICAN E., is produced by *brya ebenus*, also of a natural order *leguminosæ*, but the wood is of a greenish-brown rather than a black color. It receives a good polish, is very hard and durable, and much sought after by musical-instrument makers. It is one of the articles of export from the West Indies to Britain. But the tree is of small size, seldom more than 12 ft. high, and the trunk only a few inches in diameter.

EBRO (Lat. *Iberus*), an important river of Spain, rises in the province of Santander, at a point greatly elevated above the level of the sea, about 12 m. n.w. of Reynosa, flows s.e. for about 25 m.; then e. past Frias, after which it maintains a general s.e. course, passing Miranda, Haro, Logroño, Tudela, and Zaragoza, when it turns n., passes Mequinenza, flows s.e. to Mora, s. to Tortosa, and finally e. to the Mediterranean, into which it falls after a course of about 470 miles. Its mouth is choked up with sand, and, to render it navigable, a canal called the San Carlos has been carried through the delta. Its principal affluents are the Najerilla, Jiloca, and Guadalope from the right, and the Aragon, Gallego, and Segre from the left. The course of the E. is chiefly through narrow, and sometimes rocky valleys; and its bed is characterized by many shoals and rapids which interrupt the navigation. This is partly remedied, however, by means of the Imperial canal, which extends from the vicinity of Tudela to a point 40 m. below Zaragoza.

EBULIOSCOPE, an instrument for ascertaining the strength of distilled liquors by observing the boiling point and the atmospheric pressure.

ÉCARTÉ, a game at cards, probably first played early in the present century in Paris, though it appears to have grown out of an old game called *la triomphe*, or French-ruff. It is usually played by two persons, though sometimes by three, the third player taking the place of the loser in the first game, and the pool not being taken except by the winner of two games in succession. In French *écarté*, bystanders are permitted to advise, and the player losing leaves the table, his adviser taking his place. If, however, the loser is playing *la chouette* (i.e., taking all bets offered), he need not retire on losing. The small cards are removed from a pack, and the player cutting highest deals. He gives five cards, by two and three at a time, to his opponent and himself, and turns up the eleventh card for trumps. The trump card, if a king, counts one for the dealer. His adversary, if satisfied with his hand, plays; if not satisfied, proposes, and the dealer can accept or refuse. Should he accept, each may discard, face downward, as many cards as he may choose, receiving fresh ones from the cards yet undealt, these being given first to the non-dealer, till his hand is complete. A second proposal and a third may be made, and so on till the player is satisfied; but if the dealer refuse, the hand must be played without discarding. The king of trumps scores one if in either hand. The non-dealer being satisfied with his hand, leads; the dealer follows; and the trick is taken by the highest card, or the trump. The king is the highest. The winner of a trick leads to the next. The second player must follow suit, and must win the trick if he can. The game is scored by the king, as explained, and the majority of tricks. Three tricks score one for the point; all five tricks won by one player score two for the *vole*. When the non-dealer does not propose, or his proposal is refused, and he fails to gain three tricks, the dealer scores two, but no more even though he win the *vole*. The game is five up.

ECBATA'NA (Agbatana, Achmêta, Hagmatana), the ancient capital of Media, situated at a distance of 12 stadia (about $1\frac{1}{2}$ m.) from Mt. Orontes, the modern Elwend. Its foundation was attributed by popular belief to Solomon or Semiramis, while the book of Judith ascribes it to Arphaxad (Phraortes?), and Herodotus to Deioces (728 B.C.). It lay upon a conical hill, crowned by a temple of the sun, and was inclosed by seven concentric walls, the innermost of which was gilded, and the next plated with silver; while the rest, in their order outwards, were painted orange, blue, scarlet, black, and white, respectively. As they rose in gradation towards the center, all the battlements

with their gorgeous hues—probably representing, in Sabæan fashion, the seven planetary spheres or the seven climes—were visible at once. The city is reported to have been 250 stadia in circumference. Its principal buildings were the citadel—a stronghold of enormous dimensions, where also the archives were kept, in which Darius found the edict of Cyrus the great concerning the rebuilding of the temple in Jerusalem—and the royal palace. Cedar and cypress only were used for the woodwork, and the ceilings, beams, and rafters were overlaid with gold and silver. The mild climate and the magnificence of its structure singled out E. as the favorite summer residence, first of the Median, then of the Persian, and, lastly, of the Parthian monarchs. After the battle of Arbela (331 B.C.), Alexander followed Darius thither, and secured an immense booty. It was again pillaged by the Seleucidæ; but such were the riches of this place, that Antiochus the great still found 4,000 talents' worth of silver to carry away. E. subsequently fell into the hands of the Parthians; and it has since so utterly sunk into decay, that notwithstanding the frequent mention that is made of it both in the Bible and in classical writings, its very site can no longer be fixed with certainty. Gibbon and Jones tried to identify it with Tabriz or Tauriz; Williams, with Isbahan; while recent explorers, such as Rennell, Mannert, Kinneir, Morier, and Ker Porter, generally agree that the present Hamadan, with the supposed tombs of Mordechai and Esther (see HAMADAN), occupies the site of ancient Ecbatana. Sir Henry Rawlinson assumes two Ecbatanas, one the present Hamadan, the other the present Takhti-Suleiman, 36° 25' N. lat., 47° 10' W. long. Both the orthography of the scriptural Achmêta, and the cuneiform Hagmatana in the Behistun inscriptions, which, by changing the *m* into *b*, became Agbatana in Greek, seem to point to Hamadan. Broken columns, a few cuneiform inscriptions, coins, medals, and a fragmentary stone lion, placed there, according to the Eastern legend, by the sorcerer Apollonius of Thyane, at the command of Nebuchadnezzar, in order to guard the town from excessive cold and snow—all dug out near Hamadan—are all that now remains of that once most royal of cities. There was another ECBATANA in Persia, which was given to the Magi; and a third in Syria, at the foot of Carmel, the present Kaiffa, where Cambyzes, the son of Cyrus, suddenly died 520 B.C.

ECCALEO'BION, an oven for hatching eggs. The eggs are placed on shelves one above the other, so fixed that the eggs can be turned over once in a day or two. The proper temperature is provided by steam or warm water. Artificial hatching was one of the most ancient inventions of Egypt. Perhaps the idea was taken from the hatching of eggs in the hot sand of that country. See INCUBATION.

ECCARD, JOHANNES, 1553–1611; b. Prussia; a composer of church music. He was a pupil of Orlando Lasso, at Munich. In 1583, he became assistant conductor, and in 1595, chapel-master, at Königsberg. In 1608, he was chief conductor of the elector's chapel in Berlin, where he died. His works are songs, sacred cantatas, and chorales. He set to music the great national hymn of the Germans, *A Mighty Fortress is our God*, (Luther's *Ein feste Burg ist unser Gott*). Many collections of his songs are extant.

ECCE HOMO (Lat. "Behold the man"), the name usually given by artists to paintings representing Christ bound and crowned with thorns previous to his being led forth to crucifixion. On this exalted subject the highest efforts of art have been employed. The finest "Ecce Homo" is that of Correggio, in the National Gallery, London; the whole conception of this remarkable picture being of the first order of genius. Other conceptions have been painted, such as that of Guido. See Dr. Waagen's *Art and Artists in England*.

ECCENTRIC, in machinery, is a contrivance for taking an alternating rectilinear motion from a revolving shaft. It consists of a circular disk or pulley, fixed on a shaft or axis which does *not* pass through the center of the disk. The disk has a groove upon its circumference in which the hoop—by means of which the rod is attached to the disk—slides. As the eccentric revolves with the axis, the hoop is alternately raised and lowered, and with it the rod which is keyed into it. The extent of the rise and fall of the rod is equal to twice the distance between the centers. The E. is chiefly used where a subsidiary motion of small power is required; as for working the force-pump that supplies the boiler of a steam-engine (q.v.).

ECCENTRIC, or **ECCENTRIC CIRCLE** (in the Ptolemaic astronomy). It was a fundamental doctrine with the ancient astronomers, that every heavenly body moved in a circle (the perfect figure), and at a uniform rate. To move otherwise than uniformly and in the perfect figure, would have been unbecoming a heavenly body! But some of them appeared to misbehave by moving unsteadily, and in other figures than circles. Of course, this was a mere deceptive appearance; but then, to save the fundamental doctrine, it must be explained. To explain it, they invented the *eccentric* circle. Suppose a body, such as the sun, to move in a circle at a uniform rate, and a spectator to observe it, not from the center of the circle, but from a point half way between the center and the circumference. Then it is evident that, by hypothesis, to an observer at the center of the circle, the motion of the sun is uniform; i.e., the sun travels through equal angular distances in equal times. When, however, the observer is located at the second point, the angular distances traveled through in equal times are unequal. If, then, the earth, instead of being at the center of the sun's orbit, be in a position away

from it, the want of regularity in his movements will be explained. Accordingly, to reconcile the observed fact with the fundamental doctrine, the ancients placed the earth at a point away from the center of the sun's supposed orbit. Hence this orbit was called the *eccentric*, in respect that its center did not coincide with that of the earth, which was considered as the center of the universe.

EOCENTRICITY. In the ellipse and hyperbola (q.v.), the E. is the ratio of half the distance between the foci to the semi-major axis. In older mathematical works, E. is sometimes used as the name of half the distance between the foci of an ellipse or hyperbola.

ECHELLENSIS, OR ECHELLENSIS, ABRAHAM, b. Syria, near the close of the 16th c.; educated in the Maronite college in Rome, and professor of Arabic and Syriac in the college of the Propagandists. In Paris, he assisted in the preparation of Le Jay's Polyglot Bible. He published several Latin translations of Arabic works, and was engaged in a controversy with Selden as to the historical grounds of episcopacy. D. 1664.

ECCHYMO'SIS (Gr. from *ek*, out of, and *chymos*, juice), a discoloration of the surface, produced by blood effused below, or in the texture of, the skin. It is usually attended by swelling to a greater or less extent, and is the result of injury. The presence of E. is sometimes adduced in courts of law as a proof of violent injuries having been inflicted during life, or very shortly after death.

ECGLEFECHAN, a small village of Dumfriesshire, Scotland, twenty miles north of Carlisle, and on the Caledonian railroad. Thomas Carlyle was born and buried here, and the village is believed to be the "*Entepfuhl*" of his *Sartor Resartus*.

EC'GLESFIELD, a township in the West Riding of Yorkshire, 5 m. n. of Sheffield. Pop. '91, 25,890. The chief manufacture is cutlery, but flax, linen, and nails are also branches of industry. There are coal and iron mines in the vicinity.

ECCL'E'SIA. I. The great assembly of the Athenians in which all free citizens might vote. Its authority was supreme, but, as in the growing power of the higher classes it was after a time seldom convened, the entire management of the state fell into the hands of the archons, who were chosen from the aristocratic classes. Solon (B.C. 594) ordained that it should meet monthly, on established days, and at other times when emergencies arose. It was convened by the *prytanes*, was presided over by the *epistates*, and, after it had been constituted by the offering of sacrifice and prayer, the *proedroi* announced the subjects for consideration, which had already been acted on by the senate, but required the consent of the people before they could become laws. Citizens who were over 50 years of age were first invited to speak; afterwards any one over 30 might be heard. The voting was by stretching forth the hands, or by depositing beans and stones in vessels prepared for them. When the business had been finished the *prytanes* dismissed the E. In Sparta, also, there were assemblies of the same name. One kind, composed only of citizens of Sparta itself, was called the little E. It met once a month, at first in the open air and afterwards in a building erected for the purpose. Any citizen over 30 years of age might speak. Another kind, called by way of eminence the E., was composed of the kings, senators, magistrates, and delegates from all the towns and cities of the province of Laconia. It had cognizance of all affairs of common interest and importance to the whole state. The voting at Sparta was by acclamation, and not by ballot. The majority was determined by the comparative volume of sound, or, if that was doubted, by a division and counting of the two parties. II. In the Greek of the New Testament, E. is the name for the company of Christ's disciples professing to trust in him as their Saviour and to obey him as their Lord. It is applied to a small assembly of them, such as were members of one family, or could meet in a dwelling-house of ordinary size; to the whole number in one city or neighborhood; to the whole number on earth; to all that are in heaven; and to the innumerable company on earth and in heaven. It has other meanings, but is usually rendered *Church*.

ECCL'ESIAS' TES (Eng. the Preacher), the title (taken from the Septuagint) of a canonical book of the Old Testament; its Hebrew name is *Kohleth*, which signifies nearly the same. The inscription with which it commences is: "The words of Kohleth, the son of David, king in Jerusalem." Its authorship is commonly ascribed to Solomon. In support of this opinion, however, there is not a vestige of internal evidence except what arises from the dramatic use of his name, an expedient in all probability resorted to by the writer to give force and emphasis to his own reflections, inasmuch as Solomon was held by the Jews to be the perfection of human wisdom. The first who doubted the Solomonian authorship of the book was Grotius. Later critics have advanced further than Grotius. The actual writer probably flourished, according to Dr. Davidson, in the later period of the Persian government, not long after the time of Malachi, i.e., 350-340 B.C. Such is also substantially the opinion of Rosenmüller, Knobel, Ewald, and De Wette. Hengstenberg, unquestionably the ablest critic of the orthodox German school, considers that the contents of the book may best be explained by supposing the author to have lived in a period like that of Malachi, in which there prevailed a pharisaical self-righteousness, and melancholy murmurings against the providence of God. The dates assigned to it by Hartmann (viz., the period of the Maccabees) and by Hitzig (204 B.C.)

cannot well be sustained, as there is no trace in the book either of Grecian philosophy or language.

The chief arguments against the Solomonian authorship are *three*. 1. The writer indicates unconsciously his own posteriority in point of time by making Solomon say: "I was king over Israel in Jerusalem" (chap. i. verse 12); a thing which Solomon could not have said during his life, for he was king to the end of it. 2. The condition of the country in the time of the writer, the oppression, judicial injustice, the elevation of fools and slaves to high offices, etc., do not fit the reign of Solomon at all, nor any preceding period. 3. The language is post-exilian. Ewald, the greatest of recent orientalists, asserts that "the Hebrew is so strongly penetrated with Aramæan, that not only single often-recurring words are entirely Aramæan, but the foreign influence is infused into the finest veins of the language."—(Dr. Davidson in vol. ii. of Horne's *Introduction to the Holy Scripture*.)

It is extremely difficult to ascertain the stand-point of the author. He is deeply convinced that "all is vanity and vexation of spirit," but whether this conviction springs wholly from a religious view of life, or is in part caused by personal disappointments, we have not sufficient internal evidence to determine. There is much in E. that, if it stood by itself, might be thought to be a mere product of cynical epicureanism, but it is mixed up with so much that is nobler, with a faith in God that rises high above the crushing considerations of the vanity of all mortal life, and the book terminates so grandly, that it seems more reasonable to believe that the aim or intention of the writer was moral and religious, and not cynical; that he painted the folly, weakness, and helplessness of men in such strong colors, only that he might destroy their self-righteousness, and cure them of that inability to read the laws of God, which self-righteousness always produces.

ECCLIASTICAL COMMISSIONERS FOR ENGLAND, "are a corporation with perpetual succession and a common seal, and with power to take, purchase, and hold real estate, notwithstanding the statutes of mortmain."—Burns' *Eccles. Law by Phillimore*. The ecclesiastical commissioners consist of all the bishops of England and Wales, the deans of Canterbury, St. Paul's, and Westminster, five cabinet ministers in addition to twelve lay members, partly appointed by the crown and partly by the archbishop of Canterbury. The lay commissioners, including all the judges, to be members of the united church of England and Ireland. 6 and 7 Will. IV. c. 77, and 3 and 4 Vict. c. 113, down to 29 and 30 Vict. c. 111. The queen is empowered, by 13 and 14 Vict. c. 94, to appoint two, and the archbishop of Canterbury one (lay members of the church of England), by the title of church estates commissioners. The ecclesiastical commission thus constituted is the result of certain reports made by commissioners previously appointed by the crown. The object of the existing commission is best explained by a reference to the instructions given to the original commissioners. "To consider the state of the several dioceses of England and Wales, with reference to the amount of their revenues and the more equal distribution of episcopal duties, and the prevention of the necessity of attaching by commendam to bishoprics benefices with cure of souls; to consider also the state of the several cathedral and collegiate churches in England and Wales, with a view to the suggestion of such measures as may render them more conducive to the efficiency of the established church; and to devise the best mode of providing for the cure of souls, with special reference to the residence of the clergy on their respective benefices." The ecclesiastical commission was permanently established in the year 1835. In order that it should be provided with a fund to enable it to carry out such schemes as should appear to it desirable, the seven best endowed sees were laid under a contribution amounting in all to the annual sum of £23,800. In addition to the income thus provided, several canonries in the various cathedrals are abolished, and other ecclesiastical preferments are extinguished, and the emoluments of the whole are vested in the commissioners. The ecclesiastical commissioners are required to lay before her majesty in council such schemes as appear to them best adapted for carrying out the purposes of the act. It is provided that no proceeding which requires the common seal of the corporation is to be finally concluded, nor is the seal to be affixed to any deed, unless two at least of the episcopal commissioners are present, and consenting. Notice of every scheme is to be given to any corporation, aggregate or sole, affected thereby; and the objections, if any, are to be laid before her majesty in council, together with the scheme. The scheme, if it receive the royal assent, is to be gazetted, and thereupon acquires the power of an act of parliament. By 19 and 20 Vict. c. 55, the duties of the church building commissioners have been transferred to the ecclesiastical commissioners. The latter body have now, therefore, in addition to their previous powers, authority to divide or to unite existing parishes, and to create new districts. Such are, very briefly, the powers of the ecclesiastical commissioners. The policy which led to the appointment of that commission is not a subject for our consideration. But it is easy to see that the influence for good and evil of so powerful an institution, over the church of England, is enormous; and it cannot be matter of surprise that its proceedings are watched with scrupulous jealousy. As a result of its deliberations during 25 years of its existence, two new bishoprics have been created and endowed, and a considerable number of small livings had been augmented.

On the other hand, it must be observed that much indignation has been excited by the expenditure of very large sums on the purchase and improvement of episcopal residences. It is, no doubt, fitting that the episcopal office should be furnished with

appliances suitable to the position and dignity of a bishop; but the peculiar character of the revenues of the ecclesiastical commissioners must be borne in mind in applying those revenues. The funds of which they are composed have been violently diverted from the original purpose of the donors. Public necessity only can justify such an act. The plea put forward is the inequality of the revenues of the clergy, and the insufficient amount of the incomes of many benefices. But it may fairly be questioned whether it is a proper application of those funds to promote the convenience and luxury of those who are already liberally endowed.

ECCLESIASTICAL CORPORATION. The holder of an ecclesiastical benefice is, by the law of England, regarded as a corporation. Ecclesiastical corporations are divided into aggregate and sole. The former consist of several persons, as the head and fellows of a college, the dean and chapter of a cathedral, and are kept up by a continual succession of members. An ecclesiastical corporation sole consists of a single person and his successors in the benefice, as a bishop, a rector, a parson, or a vicar. The object of the common law, in thus regarding the incumbent of the benefice as a corporation sole, is to preserve the temporalities which are vested in him, and which would otherwise descend to his right heirs. The right of a rector or other corporation sole to the church and glebe, though said to be a freehold, is in fact little more than a tenancy for life. He is entitled to the full enjoyment of the benefice during his life, but he cannot sell it, and he is even punishable for waste. He may work mines or pits which he finds in use, but he is not entitled to open fresh mines. His right to timber is confined to felling it for repairs, but he is not entitled to sell it. See CORPORATION.

ECCLESIASTICAL COURTS are courts specially devoted to the consideration of matters relating to the clergy and to religion. For the origin of these courts we must go back to the first days of Christianity, when the early Christians, acting upon the injunction of St. Paul—"Dare any of you having a matter against another go to law, before the unbelievers and not before the saints"—had established courts, apart from those provided by the heathen governors, for the settlement of their own disputes. These courts were presided over by the bishops, who took cognizance of all matters, temporal as well as spiritual, arising among the brethren. As Christianity advanced, and was acknowledged as the revelation of the Almighty, these bishops' courts acquired an independent position, and were suffered to exist concurrently with courts of civil jurisdiction (Code lib. i. tit. 4, *de episc. aud.*), and gradually special matters were assigned as the subjects of their peculiar jurisdiction—viz., questions of tithes, and matrimonial and testamentary causes.

All writers on the early constitution of England are agreed in the opinion that, in this kingdom, there existed no separate E. C. before the Norman conquest. Previous to that time, all matters, civil and spiritual, were in use to be heard before the county court, in which the bishop and the earl sat together. But by a charter of William I. a distinction was made for the first time between courts civil and ecclesiastical. By this charter, authority was given to the bishops to hear causes ecclesiastical according to the canon law. The bishops' courts having been thus established in England, they became a fruitful source of dispute between the crown and the see of Rome, the latter claiming supreme jurisdiction in appeal in all causes ecclesiastical. This claim was from time to time conceded by the weakness or necessity of individual sovereigns. To be as frequently retracted when the emergency was past; in particular, by 27 Ed. III. c. 1 and 16 Rich. II. c. 5, all persons were prohibited, under penalty of *præmunire* (q.v.), from resorting to the court of Rome or elsewhere. At the reformation, by 24 Hen. VIII. c. 12, on the recital that the king is, under God, the head of the church, and again, by 25 Hen. VIII. c. 21, the authority of the pope in matters ecclesiastical was finally excluded. In Bacon's Abridgment of the Law, there are enumerated ten E. C.—viz., convocation, the court of arches, the prerogative court, the court of audience, the court of faculties, the court of peculiars, the consistory court, the archdeacon's court, the court of delegates, and the court of commissioners of review. (For a full account of these courts, reference is made to the several heads, and also to the article DOCTORS' COMMONS.) Under the regulation of public worship act of 1874, a new ecclesiastical judgship was called into existence, with cognizance mainly of offenses in the matter of ritual.

The chief E. C. which have at various times existed in Scotland are the general assembly, the commissary court, and the court of teinds. The former is the tribunal for the consideration of questions of doctrine and discipline according to the Presbyterian usage, and has existed since the reformation. See ASSEMBLY, GENERAL; COMMISSARY.

ECCLESIASTICAL HISTORY, in its widest range, is the history of religious organization among men, on the basis of divine revelation, from the creation to the end of the world. It is distinct from secular history; yet so inseparably connected with it, that one can never be fully understood without the other. Ecclesiastical history is divided into two great periods by the completion of the Scriptures as the inspired word of God. The first, extending from the creation to the end of the apostolic age, includes the days before the flood, the times of the patriarchs, of the exodus from Egypt, and the conquest of Canaan, of the kings and prophets, the captivity, restoration, and sub-

jection to Roman rule; the mission of John the Baptist, the advent, life, and work of Christ, and the apostolic founding and extension of the church. At the close of the apostolic age, ecclesiastical history, in its more restricted range, begins. It may be assigned in three great divisions:

I. ANCIENT CHRISTIANITY, from the death of the apostle John to Charlemagne, A.D. 100-800.

1. *The age of persecution*; to the accession of Constantine, 100-325. The principal part of the "ten" persecutions; testimony of the martyrs, confessors, and argumentative defenders of Christianity; beginning of monasticism; rise and progress of the hierarchy; extension of Christianity throughout the empire and beyond its bounds.

2. *The imperial age*; Constantine to Gregory I., 325-590. Influence of Christian emperors within the church; complete establishment of the hierarchy; Arian and Pelagian controversies; fall of paganism; missionary work of Patrick and Columba in the British isles; five general councils, Nicæa, 1st Constantinople, Ephesus, Chalcedon, 2d Constantinople.

3. *The age of Christian nationality* in Europe; Gregory I. to Charlemagne, 590-800. Evangelical British missions in France and Germany; Britain reappears as England, "*Angli or angeli*;" rise of Mohammed; the Saracens overrun Asia, Africa, and Spain, but are defeated in the west by Charles Martel; controversy and commotion concerning image worship and image breaking; temporal power of the pope granted by Pepin and confirmed by Charlemagne; Charlemagne crowned emperor by the pope.

II. MEDIEVAL CHRISTIANITY, Charlemagne to Luther, 800-1517.

1. *Continued progress of Christianity*; Charlemagne to Hildebrand, 800-1049. Extension of the Latin church in the west and of the Greek in the north-east; progress of the papacy; rise of scholasticism.

2. *Supremacy of the papacy*; from Gregory VII. to Boniface VIII., 1073-1294. Contest between the pope and the emperor; celibacy of the clergy enjoined; the crusades; culmination of scholasticism; mysticism.

3. *Decline of the papacy*; Boniface VIII. to Luther, 1294-1517. The Scriptures forbidden to the laity; the inquisition founded; persecution of the Albigenses; transubstantiation and auricular confession established; reformatory councils of Pisa, Constance, and Basle; heralds of the reformation—Wycliffe in England, Huss in Bohemia, Wessel in Holland, Savonarola in Italy; capture of Constantinople; revival of letters; invention of printing; maritime adventure; discovery of America.

III. MODERN CHRISTIANITY; Luther to the present time, 1517-1880.

1. *Age of Protestant reform and papal reaction*; Luther to peace of Westphalia, 1517-1648. Protestant churches in Germany, France, Switzerland, England, Scotland, America; Puritans, Jesuits, Jansenists; massacre of St. Bartholomew; Protestants banished from Bohemia; thirty years' war; treaty of Westphalia promising religious toleration.

2. *Age of struggle for religious liberty*; peace of Westphalia to the French and English wars in America, 1648-1750. Flight of Huguenots from France; non-conformists driven from their livings in England; growth of Greek church in Russia; increase of Protestantism in American colonies.

3. *Age of revolution, conflict, and progress*; 1750-1880. American independence, with separation of church and state; French revolution from absolute monarchy through democracy and imperialism to a republic; general uprising of the people, and advance in civil and religious liberty; growth of the United States, war of the secession, abolition of slavery, revival of evangelical religion; conflict of Christianity with various forms of irreligion and secularism—English deism, French infidelity, German rationalism, materialism; free church of Scotland; disestablished churches in Ireland; growth of ritualism; papal infallibility declared; bible societies, steam navigation, railroads, telegraphs, journalism; improvement of common schools, colleges, technical schools; extension of Christianity over the world.—See CHURCH HISTORY.

The SOURCES of ecclesiastical history are, first, *the written*; comprising acts of councils, creeds, liturgies, hymns, church laws, papal bulls, and encyclical letters, writings of the fathers, schoolmen, reformers, and anti-reformers; second, *the monumental*, including crosses, crucifixes, pictures, vestments, furniture, coins, churches, chapels; some of this class are partly written, as inscriptions on walls, pictures, tablets, and tombs. He who is thoroughly familiar with the imagery of the catacombs will sympathize more fully with the heart of the early church, during the period of persecution, than he would be able to do after the profoundest study of books alone. The basilicas, modeled after the grand secular edifices of Greece and Rome, illustrate the external enthronement of Christianity; the Byzantine churches record the splendor of the imperial age; the Gothic cathedrals are trophies of mediæval glory; those of the renaissance are memorials of the attempt to make pagan culture live again in Christian times. The ecclesiastical historian, besides general intelligence, culture, and learning, should possess the critical and judicial faculty, that he may discriminate between conflicting testimonies, and may interpret correctly the witness which he accepts. He should have an insight into speculative thought, metaphysical distinctions and ethical ideas; should be acquainted with human nature, scientifically and practically; should be in sympathy with the spirit of Christ, as exhibited in the New Testament, and have, in his inmost

being, an experience of spiritual truth. His style, in addition to all other attainable good qualities, should present a brilliant panorama rather than a lifeless schedule; should acquire a majesty worthy of the movement of the divine idea through the ages which he unfolds; and should throb with human sympathy as he narrates the endless story of sorrow and joy, fear and hope, spiritual death, and spiritual life.

ECCLESIASTICAL LAW. See CANON LAW.

ECCLESIASTICAL TITLES ASSUMPTION ACT (14 and 15 Vict. c. 60). In 1850, a ferment of Protestant zeal was awakened in Great Britain by an edict issued by the court of Rome dividing that country into territorial bishoprics, under an archbishop of Westminster. The brief was immediately followed by a pastoral by the newly appointed archbishop (cardinal Wiseman) "given out of the Flaminian gate." At the commencement of the parliamentary session of 1851, the subject of "papal aggression," and of the measures to be adopted to counteract it, superseded all other topics of interest. It was in these circumstances that lord John Russell introduced the ecclesiastical titles bill. By the act 10 Geo. IV. c. 7, it had been provided that the right and title of archbishops to their respective provinces, of bishops to their sees, and of deans to their deaneries, as well in England as in Ireland, having been settled and established by law, any person other than the person thereto entitled who should assume or use the name, style, or title of archbishop of any province, bishop of any bishopric, or dean of any deanery, in England or Ireland, should for every such offense forfeit £100. By the Roman Catholic party it was alleged that this enactment struck only at the titles to existing provinces and dioceses, and that though the pope could not create an archbishop of Canterbury, nor could his nominee assume that title without violating the law, there was no prohibition against the creation of an archbishop of Westminster. To meet this allegation, and remove the doubt which existed, the ecclesiastical titles act was passed, its object being to prohibit the assumption of such titles "in respect of any places within the United Kingdom." The penalty of £100 for every contravention of the act is to be recovered in accordance with the provisions of the former act, or at the suit of any person in one of her majesty's superior courts of law, with the consent of the attorney-general in England, or of the lord advocate in Scotland. The third section saves the episcopal bishops in Scotland from the operation of the act, providing, however, that "nothing herein contained shall be taken to give any right to any such bishop to assume or use any name, style, or title which he is not now by law entitled to assume or use." The passing of the act allayed the fears of the country on the subject of papal aggression; and though its provisions were not very steadily complied with in Ireland, no prosecution under it took place.

The Roman Catholic party having always considered the penal clauses of this act as a grievance, an arrangement was made for the repeal of the act. This was accomplished by the act 34 and 35 Vict. c. 53, which, after declaring that "no ecclesiastical title of honor or dignity derived from any see, province, diocese, or deanery recognized by law, or from any city, town, place, or territory within this realm, can be validly created," and that no "pre-eminence or coercive power can be conferred otherwise than under the authority of her majesty," repeals the ecclesiastical titles assumption act (14 and 15 Vict. c. 60) as inexpedient. The result is, that while no prosecution can now take place for assuming such titles, their assumption is still treated by the law as an illegal act.

ECCLESIASTICAL YEAR. See YEAR; also DATE.

ECCLESIASTICUS, the title of an apocryphal work, called in the Septuagint *The Wisdom of Jesus, the Son of Sirach*. It obtained the title of E., not because the writer was a priest (for regarding his profession nothing is known), but because it was, in the opinion of the fathers, the chief of those apocryphal works which they designated *ecclesiastici libri* (i. e., books not inspired, but which might be read in church for the edification of the people), to distinguish them from the canonical scriptures of the Old Testament. E. was originally composed in Aramaic; and the original text was apparently extant in the time of Jerome, who states that he had seen the Hebrew, but it is now lost. The author calls himself Jesus, the son of Sirach of Jerusalem; but when he flourished is not known. His book was translated into Greek, with an introduction by his grandson, who is usually, but not correctly, supposed to have had the same name as his grandfather. The date of the translation has been fixed as low as 130 B.C., and as high as 230 B.C. The former is the more probable. The contents of the work are not systematically arranged, so that we can only guess at what may be called the method and purpose of the thinking. The view taken of the mercy of God as extending to all mankind, indicates that the Jewish notions were breaking up; but still there is little to show that any great spirituality was taking its place. Its tone resembles that of the book of Proverbs. Exhortations to cheerfulness are constant; medicine, agriculture, etc., are highly praised; life is regarded from an ethical rather than from a religious point of view, and consequently "wisdom" is represented as the source of human happiness. The style of the writer is at times noble, and even sublime; and, to use the language of Addison, "it would be regarded by our modern wits as one of the most shining tracts of morality that are extant, if it appeared under the name of Confucius or of any celebrated Grecian philosopher."

ECCLESIOLOGY, a word of recent use, is the name which has been given in our own country to the study of church architecture and decoration. Besides discriminating the various styles of ecclesiastical architecture, E. takes account of the ground-plan and dimensions of a church; of its orientation, or the deviation of its line from the true east; of its apse, or circular or polygonal east end; of its altar or communion table, whether fixed or movable, stone or wood; of its reredos, dossel, or altar-screen; of its piscina, or basin and drain for pouring away the water in which the chalice was rinsed, or the priest washed his hands; of the sedilia, or seats for the priest, deacon, and sub-deacon, during the celebration of the eucharist; of the aumbrye, or locker, for the preservation of the communion vessels and elements; of the "Easter sepulcher," or recess for the reception of the host from Good Friday till Easter day; of the altar-candlesticks; of the altar-steps; of the altar-rails; of the credence table, or shelf on which to place the communion elements before they were put upon the altar; of the "misereres," or elbowed stalls; of seats within and without the chancel walls; of the height of the chancel as compared with the nave; of the chancel arch; of the rood-screen, rood-staircase, rood-door, and rood-loft; of the piers or columns; of the triforium or blindstory; of the clerestory; of the windows; of the parvise-turret, or outside turret leading to the parvise; of the roof or groining; of the eagle-desks and lecturns; of the pulpit; of the hour-glass stand, by which the preacher was warned not to weary the patience of the flock; of the reading pew; of the benches, pews, and galleries; of the aisles; of the shrine, firtour, or reliquary; of the benatura, or holy-water stoup; of the corbels, with special reference to the head-dress figured on them; of the pavement; of the belfry; of the baptismal font, with its accessories, the baptistery, the steps, the kneeling-stone, the chrismatory, the cover, and the desk; of the tower, with its lantern, parapet, pinnacles, louvres, windows, buttresses, and bells; of the porch and doors, with their niches and seats; of the parvise, or priest's chamber above the porch; of the moldings; of the pinnacle crosses; of the gargoyles, or rain-spouts; of the church-yard or village cross; of the church-yard yew; of the lych-gate, or corpse-gate, where the corpse was met by the priest; of the crypt; of the confessional; of the hagioscope, or opening in the chancel arch through which the elevation of the host might be seen; of the lychnoscope, or low window in the side-wall of the chancel, the use of which is uncertain; of the chest for alms; of the table of the ten commandments; of the church-plate; of the faldstool, or litany stool; of the embroidered work; of the images of saints; of the church well; of the sepulchral monuments and brasses, with their inscriptions; of the chapels or sacristies; of the vestry; of the dedication crosses. E. has a literature of its own, represented by such works as the *Handbook of English Ecclesiology* (Lond. 1847) of the "Ecclesiological Society;" Walcott's *Sacred Archaeology*; Bourassé's *Dictionnaire d'Archéologie Sacrée*. Recently, E. has been applied to a study of the constitution of the church.

ECCLESTON, JAMES HOUSTON, D.D.; b. Kent co., Md., 1838; graduated at Princeton coll., 1856; practiced law for two years. He studied theology at the Philadelphia divinity school, and was ordained priest in the Prot. Epis. church, 1865. He was rector of churches in Philadelphia, and in Newark, N. J.; and afterward was stationed at Baltimore. He was elected bp. of Iowa, 1875, but, owing to some technical obstruction, he was not consecrated.

ECCLESTON, SAMUEL, 1801-51; b. Kent co., Md., was educated at St. Mary's coll., Baltimore, where he became a Rom. Cath. He entered the seminary attached to the coll., 1819; was ordained priest, 1825; appointed vice-pres. of St. Mary's coll., 1827, and pres., 1829. In 1834 he became abp. coadjutor of Baltimore, and in the same year, on the death of the abp., Dr. Whitfield, he succeeded to the archiepiscopate.

ÉCHELON (from the Fr. *échelle*, ladder) is such a formation or arrangement of troops that, if viewed from a height, they would present some analogy to the successive steps of a ladder or staircase. The several divisions of the force, although parallel, are no two on the same alignment. Each has its front clear of that in advance, so that, by marching directly forward, it can form line with it. There are two kinds of E., *direct* and *oblique*. *Direct* E. is adapted for attack and retreat; while *oblique* E. (oblique in reference to the original front of the line) is adapted for changing position, or for getting on the enemy's flank.

The word E. is also used in reference to nautical maneuvers. A fleet is sometimes said to be arranged *en échelon*; at which time it is compared by sir Howard Douglas to a body of infantry in a square, having its diagonal parallel with the front. In other words, it presents a wedge-form towards the enemy. Under this arrangement the bow-guns and broadsides of the several ships can mutually defend each other; the stronger parts of one ship defending the weaker parts of some other.

ÉCHEVIN, an officer in France of a rank existing from the days of Charlemagne to the revolution of 1789. His general functions were financial. In Paris, the *échevins* were assessors; and in some cases they had the authority of local magistrates.

ECHIDNA, a genus of quadrupeds peculiar to Australia, and belonging to the order *monotremata*. Two species have been described, differing in the scantiness and abundance of the hair, but it seems not improbable that they are mere states of the same species, perhaps depending on the seasons or on age. The E. is about the size of a

hedgehog, and, like that animal, is covered with spines; which, however, are much larger and stronger, and are placed among soft silky chestnut-colored hair. Its head is small, the muzzle much elongated and slender, terminating in a small mouth, which is destitute of teeth, but furnished with several rows of small spines upon the palate, directed backwards. The tongue is extensile, and is used, like that of ant-eaters, for catching ants, the ordinary food of the animal. The tail is very short. The legs are also very short, each foot furnished with five large broad claws, fit for digging and burrowing, the claws of the hind feet being concave, and directed backwards and outwards, so as to form very efficient shovels for throwing out the earth. The E. burrows with great rapidity, being possessed of strength perhaps greater in proportion to its size than that of any other quadruped. When it cannot more completely disappear under the earth, it inters itself so far as to present only its spiny back to an assailant. The E. is capable of very long abstinence, and confines itself to its burrow during droughts. In confinement, it may be fed on milk, hard-boiled eggs, etc. See illus., MARSUPIALIA, vol. IX.

ECHIMYD, *Echimy*s, a genus of rodent quadrupeds, in some of their characters agreeing with dormice, but differing from them in having the tail scaly, and the fur coarse, and mingled with flattened spines. They are all South American. Some of them are known as spiny rats. One species excavates long burrows in the ground.

ECHIN'ADES, islands in the Ionian sea, around the entrance to the gulf of Corinth. They were said to have been formed by drifts from the river Achelous. They are now called the Curzolari islands, and are of little importance. Homer says they were inhabited, but later authors report otherwise. There are at present a few small villages on them. The battle of Lepanto was fought off these islands, Oct. 7, 1571.

ECHINEIS. See REMORA.

ECHINIDÆ, a family of *echinodermata*, the species of which are popularly known as sea-urchins, sea-eggs, etc. They have the body covered with a calcareous crust or shell, of an extremely porous structure (and thus differing very widely from the shells of mollusks), in polygonal plates nicely adapted to each other, and increasing by additions to the edges of each plate, so that the shell may enlarge with the enlargement of the animal, whilst new plates are also added around the superior orifice. The shell is pierced with rows of holes for the ambulacra (q. v.), and is externally covered in a living state with a membrane—sometimes very delicate, sometimes thick and spongy—which communicates by many delicate processes with the interior, and unites the bases of all the spines. The spines differ very much in the different genera and species, in their length, strength, number, and arrangement; they are attached to tubercles on the surface of the shell, by cup-like bases capable of working upon the tubercles, in the manner of a ball-and-socket joint; and they are moved by means of the connecting membrane so as to be employed in locomotion. In some species, they seem to be the principal organs of locomotion; in others, the ambulacra are so. By means of the spines, some, in which they are few and strong, can walk even on dry ground; others, in which they are minute and very numerous, employ them in burying themselves in the sand. The mouth of the E. is situated at the lower orifice of the shell, and is generally furnished with five flat calcareous teeth, moved by a very complex apparatus of bony sockets and muscles—"a very powerful mill" for grinding down their food, which is supposed to consist of small crustaceans and mollusks. The intestine is long and spiral; the vent, in the E. of most regular form, is at the upper end of the shell, exactly opposite the mouth; in others, in which there is a departure from the characteristic orbicular form, it is more or less lateral. The E. abound in all seas, and seem to have abounded still more in former geological periods. "Of all the *radiata*, they are most perfectly preserved in a fossil state," and the knowledge of their habits and organization is necessary to the geologist, "in order to understand the relations and associations of the numerous species which abound in many of the earth's strata." See illus., INVERTEBRATES, vol. VIII.

ECHINOCOC'CUS. See TAPE-WORM.

ECHINODERMATA (Gr. *spiny-skinned*), a class of radiate animals, the highest in organization of that great division of the animal kingdom. They have a digestive and a vascular system; for the former, however, there is in many of them only a single orifice; a circular and radiating nervous system has been observed in many; they are especially characterized by their well-organized skin, which in many is strengthened by calcareous plates, and in some also has the additional protection of numerous long spines. *Echinidæ* (sea-urchins) exhibit these characteristics in greatest perfection. *Asteriade* (star-fishes), *ophiuridæ* (brittle-stars), *crinoidæ*, *holothuridæ* (sea-slugs, sea-cucumbers, etc.), and *sipunculidæ*, are also ranked among the E., and have been variously arranged in orders by different naturalists. Spines are wanting in most of them; in some (*holothuridæ* and *sipunculidæ*), there are not even calcareous plates, and there is no inconsiderable departure from the ordinary and perfect radiate form, an approach being made to the forms of mollusks and worms, whilst yet the accordance with the other E. is very perfect in other parts of the organization. Almost all the E. are free, moving about at the bottom of the sea; some of them—at least in an immature state—are stalked and fixed. They are provided with "an apparatus for water circulation," a peculiar charac-

teristic of radiate animals, and which "can scarcely be said to exist in any of the other types." By means of this it is that they fill and fit for use the suckers or *ambulacra* (q. v.) with which most of them are provided, but of which the *sipunculidae* are destitute. The spines as well as the ambulacra of the E. are used by those which possess them (*echinidae* and *ophiuridae*) as organs of locomotion.—The British E. are described by Dr. Edward Forbes in an interesting work, entitled *A History of British Star-fishes and other Animals of the Class Echinodermata* (Lond. 1841).

ECHINUS, of Vitruvius, is a classical molding in the form of a series of eggs, whence it is also called the ovolo or egg-molding. The eggs are sometimes divided by an anchor or dart. The type of this ornament is sometimes said to have been the chestnut and shell.

ECHINUS, a genus of the order *echinodermata*, known as sea-urchins, found along the American coast. The common echinus of the Atlantic coast is about an inch in diameter; but some kinds are three or four times as much. They have globe shaped cases, flat on the lower side, formed of calcareous plates, covered on the outside with movable spines from 1 to 5 in. long. With the aid of the spines and a great number of feet with suckers at the ends, the animal rolls slowly over the bottom, or clings to neighboring objects. They bore holes in the hardest rocks, where they make their homes, increasing the cavities as they grow, but not the opening, and so are often prisoners for life. Some species bury themselves in the sand near the water. In tropical climates some are used for food.

ECHIUM. See VIPER'S BUGLOSS.

ECHMIEDZIN'. See ETCHMIADZIN.

ECHO (Gr. *sound*). Sound is produced by waves or pulses of the air; when such a wave comes against a wall or other opposing surface, it is reflected like light, and proceeds in another direction, and the sound so heard is an echo. Even the surface of a cloud suffices to reflect sound, as may be observed during thunder and the discharge of cannon. That the echo of a sound may return to the point where the sound originated, the reflecting surface must be at right angles to a line drawn to it from that point. Oblique walls send the echoes of a person's voice off in another direction, so that they may be heard by others, though not by him. In order to echo words distinctly, the reflecting surface must on the whole be even, or so curved as to resemble a concave mirror. This last form is necessary for returning a distinct sound when the distance is considerable. A great degree of evenness, however, is not essential, as it is no uncommon thing for the edge of a wood to return an echo. The distance of the reflecting surface must also be such as to allow a sufficient time to elapse between the sound and the return of the echo for the ear to distinguish them; when they succeed too closely, they merge into one. An interval of about $\frac{1}{3}$ of a second is necessary to discriminate two successive sounds; so that if we assume 1125 ft. as the distance traversed by sound in a second, $\frac{1}{3}$ of 1125, or 62 ft., will be the least distance at which an echo can be heard, as the sound will go that distance and return in $\frac{1}{3}$ of a second. If the distance is less, the echo only clouds the original sound, but is not heard distinct. It is these indistinct echoes that interfere with hearing in churches and other large buildings (see ACOUSTICS); hence anything that breaks the evenness and continuity of the reflecting surfaces is an improvement in this respect. The number of syllables that any particular echo will repeat, depends upon how many can be uttered in the time that the sound takes to go and return from the reflecting surface. The echo at the tomb of Metella, in the Campagna, near Rome, of which Gassendi speaks as repeating a hexameter line requiring $2\frac{1}{2}$ seconds to utter it, must therefore come from a distance of about 1500 feet. Such echoes are rare, as the various conditions are seldom all fulfilled. When there happen to be several reflecting surfaces at different distances in the direction of the sound, with a sufficient interval between them, each gives a separate and distinct echo. A similar effect is produced when two surfaces are inclined to each other in such a way as to give repeated reflections of the sound from the one to the other like the mirrors of a kaleidoscope, thus multiplying echoes of echoes. To this multiple and repeating class belong the famous echoes of Killarney, and that produced between the wings of the castle of Simonetta, near Milan, which repeats the report of a pistol 60 times.

ECHO, in music, is the repetition of a melodic phrase, frequently written for the organ, on account of the facility with which it can be produced by the stops.

ECHO, in Grecian mythology, one of the Oreades, or mountain nymphs. The name denotes sound in the abstract. Echo could not speak until spoken to—a punishment inflicted upon her by Juno, who was detained by Echo's talkativeness while Juno was hunting among the Oreades for her truant Jupiter. A further legend is that Echo fell in love with Narcissus; but as he did not respond, she wasted away with grief until nothing but her voice remained; whereupon Nemesis punished the fickle Narcissus by causing him to fall in love with himself.

ECHO CAÑON, a deep ravine in Utah, near the Union Pacific railroad; 975 m. w. of Omaha. The sides are of rock, bare, and almost vertical in position. The scenery is remarkably beautiful and sublime.

ECHOLS, a co. in s. Georgia, bordering on Florida, intersected by a branch of the Plant System railroad, and the Allapaha river; 390 sq. m.; pop. '90, 3079, includ. colored. The surface is level and the soil sandy. Productions, corn, cotton, etc. Co. seat, Statenville.

E'CIJA, a city of Spain, Andalusia, in the province of Seville, and 45 m. e.n.e. of the town of that name, is situated on the left bank of the Jenil, in lat. 37° 33' n., long. 5° 8' w. It is surrounded by gardens, and stands in the center of a district fertile in corn and oil. E. is a well-built and prosperous town. On account of the heat of the climate, this town is called by the Spaniards the oven of Andalusia. E. has many pleasant alamedas (public promenades), shaded by trees, and adorned with statues and fountains; the principal promenade is that which stretches along the banks of the river. Pop. '87, 23,615. E. was called in ancient times *Astigis*, and was one of the chief cities of the Roman province of Hispania Bœtica; its origin is unknown. It is said to have been visited by the apostle Paul, a gilt statue of whom may be seen in the city. E. was called *Colonia Augusta Firma* by the Romans, and abounds in Roman antiquities. It also presents several specimens of Moorish architecture in the shape of gates and massive towers.

ECK, JOHANN MAYR VON, the well-known adversary of Luther, was b. in 1486 at Eck, a village in Suabia, where his father, Michael Mayr, was a peasant, and afterwards a bailiff. Endowed with considerable ability, young E. commenced at an early period the study of the church fathers and the scholastics, and acquired a great skill in theological disputation. In 1518, when his *Obelisci* appeared in opposition to Luther's *Theses*, he was doctor of theology, canon of Eichstädt, and pro-chancellor of the university of Ingolstadt. The publication of his *Obelisci* involved him in a disputation with Karlstadt, which lasted from the 27th June to the 16th July, 1519. The only effect of the disputation on the people was to make them wonder at E.'s volubility; but having impugned some of Luther's views in the course of his disputation, he was assailed by the great reformer, and by Melanchthon. E. nicknamed his opponents *Lutherans*, and instigated partly by personal hatred, and partly by Fugger (q.v.), went to Rome in 1520, to induce the pope to take strong measures against Luther. He returned with a papal bull of condemnation in his pocket, but the people in many places stood by Luther; and at Leipsic, in particular, E. was so roughly received, that he had to take refuge in the monastery of St. Paul's. Later we find him at the Augsburg diet of 1530, where he let slip out the memorable statement, that "with the church fathers, he would venture to oppose the Augsburg confession, but not with the Scriptures." In the religious convocations held at Worms in 1540, and at Ratisbon in 1541, he also took part. He died in 1543. A desire to shine and to play an important part in the affairs of men, coupled with a strong love of lucre, were the leading features of his character. Though an extremely learned ecclesiastic, he had no great talent, but was loud, boisterous, and full of assurance. See *Life*, by Wiedmann (Regensburg) (1865).

ECKERMANN, JOHANN PETER, well known to the literary world through his intercourse with Goethe, was b. in 1792, at Winsen on the Lube, in Hanover, studied, 1821-23, at Göttingen, and afterwards went to Weimar, where he took part in the *rédaaction* of the last volume of Goethe's *Sämmtliche Werke*. At the same time, he commenced to contribute articles to the *Morgenblatt*, on art and antiquity. In 1827, the university of Jena conferred on him the degree of PH.D. Two years later, he was appointed to superintend the studies of the heir to the grand duchy of Weimar, in the German and English languages and literature. In 1830, he traveled with Goethe's son in Italy, and on the death of the patriarch of German literature, he edited his posthumous writings. During the years 1839-40, he edited a new edition of Goethe's *Sämmtliche Werke*, in 40 vols. But E. is most widely and favorably known by his *Gespräche mit Goethe* (Conversations with Goethe). The greater part of these *Gespräche* appeared at Leipsic in 1836, the remainder at Magdeburg in 1848. It cannot be said with truth that E. has done for Goethe what Boswell did for Johnson, because Goethe did not require this. Johnson's writings give us but a faint idea of the man; hence Boswell's *Life* looks like a revelation; whereas there was the most perfect harmony in Goethe between the man and the author. Still, E.'s book is of immense value, just because it shows us this harmony, giving us, as it does, a picture of Goethe in his manifold social and literary relations, and exhibiting to us the simple, natural, and noble principles on which he studied and wrote. The *Gespräche* have been translated into all European languages, even into Turkish. The best English translation is that by John Oxenford (Lond. 1850). E. died at Weimar, 3d Dec., 1854.

ECKFORD, HENRY, b. Scotland, 1775; d. Constantinople, 1832. He was one of the earliest of the famous shipbuilders of New York. In 1812, during the war with England, he built a fleet of vessels for service on the lakes. He was the builder of the *Robert Fulton*, which made the voyage by steam to Havana and New Orleans. In 1820, he was naval constructor at Brooklyn, and built six ships of the line. Afterwards he built many ships for foreign powers. In 1831, he built a man-of-war for Mahmoud, the sultan of Turkey, and visited that country to organize a navy-yard.

ECKHART, JOHANNES, generally called MEISTER (master) ECKHART, lived in the latter part of the 13th and beginning of the 14th c.; b. probably about 1260. He was

of the Dominican order, and for some time professor in a college in Paris. Boniface VIII. called him to Rome to assist in the controversy between the pope and Philip of France. In 1304 he was provincial of his order for Saxony, and in 1307, vicar-general of Bohemia. He was distinguished for practical reforms, and for his power as a preacher. He systematized and expounded the fundamental notions of the Beghards (see BÉGUINES) and Brethren of the Free Spirit. The opponents of the Beghards found some propositions in Eckhart's works for which he was called to account by the inquisition at Cologne. He made a conditional recantation, and appealed to the pope, by whom some of his propositions were formally condemned. About the time of the issuing of this condemnation, Eckhart died. His works show that he was deeply learned in all the philosophy of the time, and one of the profoundest thinkers of all time. His style is without system, brief, mystical, and full of symbolical expressions; but his thinking was clear, calm, and logical; and he gave the most complete exposition of what may be called Christian pantheism. The starting point of his doctrine is that, apart from God, there is no real being. But, in his view, God is the unknown. He conceives of the Godhead, as without any thing that can be affirmed concerning it. Any thing definitely ascribed to it would limit and therefore destroy its infinity. The Godhead is not God as known to us. From it proceeds the triune God, who is known. The *essence* of the Godhead is what it is in itself; its *nature* is that which it becomes as an object for others. It reveals itself in the personal God, the Father. The Son is the word or expression through and in which the Father becomes self-conscious. The Father eternally begets the Son, and the Son's return into the Father in love and mutual will is the Spirit. The Father is not before the Son; only through the begetting of the Son, only through arriving at self-consciousness, does he become the Father. The genesis of the Son from the Father involves also the production of the world of things; for God is reason, and in reason is contained the ideal world of creatures. In the Son all things are made in ideal form. As all things have arisen from God, so they all tend to return to him. Repose in him is the end of all things; and in man, the noblest of creatures, this end is realized. In him, specially, there is the power of reaching to the absolute, the ground both of God and the universe. This power—which E. called *the spark*—is in truth God working in man. In cognition of God, God and man are one; there is no distinction of knower and known. Union with God—the birth of the Son in the soul—is the ultimate end of activity and is to be attained by resigning all individuality. When this is reached the soul is one with God; its will is God's; it cannot sin. Yet all this applies only to the "spark" in the soul, the other powers of which may be properly employed about other things. Thus, the way is left open to adjust the balance between feeling and action; between philosophical theory and practical life. In Eckhart's theories appear at least the elements of some modern metaphysical speculations.

ECKHUNG' CHOO, a river of Thibet, is supposed to be the head stream of the Indus. It rises on the n. side of the Himalaya, near the sources of the Sutlej. The actual locality of its sources has been assigned to the Kailas mountains, in lat. 31° 25' n., and long. 81° 40' east. Flowing to the n.w., E. C. reaches long. 79° e. before it assumes the name of Indus.

ECK MÜHL, a village on the Laber, in Bavaria, notable for the battle fought there, on the 22d April, 1809, between 75,000 French and 40,000 Austrians. The archduke Charles had taken up his position on the right bank of the Danube, near Eckmühl. From this point, at the head of four divisions of the Austrian army, he threatened Napoleon, and hoped to gain possession of the road to Donauwörth, the occupation of which would have decided the fate of Bavaria. This was prevented by Davoust, who, moreover, by repeated attacks, contrived to keep the archduke in ignorance of Napoleon's designs. The plan of the latter was to cut off the Austrians from their whole remaining communications with the Iser and Inn, and by throwing them back upon Ratisbon and Bohemia, as their only line of retreat, to sever them entirely from the support and protection of Vienna. On the 22d, Napoleon suddenly appeared, with his army, opposite the village of Eckmühl. The action, on the side of the French, was commenced by Lannes, who drove back the Austrian left, while, at the same time, the village of E. was stormed by the Würtembergers. Shortly after, the high grounds between E. and Laichling, also occupied by the Austrians, were abandoned after a heroic struggle, and the archduke ordered a retreat on Ratisbon, which was admirably executed, though the defeated army was harassed by sixteen cavalry regiments. During the retreat, a magnificent and thrilling encounter took place at Eglofsheim between the French and Austrian cuirassiers, which, though it ended fatally for the latter, was largely instrumental in securing the retreat of the main body of the Austrian army. The Austrians had 5,000 men killed and wounded, and 7,000 taken prisoners, besides losing 12 standards and 16 pieces of cannon. The French loss was considerably less.

ECLAMP'SIA (Gr. *ek*, and *lambanō*—Ion. fut. *lampsomai*—I seize hold of), a somewhat pedantic and unnecessary technical term for convulsion (q.v.).

ECLECTICS, **ECLECTICISM**. Eclectics was the name given in ancient times to those philosophers who had no determinate system of their own, but who professed to choose (*eklegein*) from all systems the parts that they considered true. The systems from which the selections were originally made were those of Pythagoras, Plato, and Aristotle, but

ultimately eclecticism lapsed into an attempt to reconcile Platonism and Christianity. The chief representatives of this school were Plotinus and Proclus, who, however, did not so much make up a compound of doctrines gathered from without, as set up a view that endeavored to unite the results of previous systems into a consistent whole. Many of the early fathers of the Christian church who had been educated in the pagan schools of philosophy and rhetoric, and retained a fondness for their early studies, were E., such as Clemens Alexandrinus and Synesius of Cyrene. Modern eclecticism is conceived by some to have originated with Bacon and Descartes, but Hegel may be more properly considered its founder. In his *Philosophy of History* and other works, he endeavors, among other things, to point out the true and false tendencies of philosophic speculation in the various ages of the world; but it is to the lucid and brilliant eloquence of Victor Cousin (q.v.) that modern eclecticism owes its popularity. This system, if it can be so called, may best be defined as an effort to expound, in a critical and sympathetic spirit, the previous systems of philosophy. Its aim is to apprehend the speculative thinking of past ages in its historical development, and it is the opinion of some that such a method is the only one possible in our day in the region of metaphysics.

ECLECTIC SCHOOL OF MEDICINE. See AMERICAN ECLECTIC.

ECLIPSA REON, the name given by Ferguson, the astronomer, to a contrivance which he invented for exhibiting the time, quantity, duration, and progress of solar eclipses.

ECLIPSES. An eclipse is an obscuration of one of the heavenly bodies by the interposition of another, either between it and the spectator, or between it and the sun. The causes of E., as suggested in this definition, are so simple and familiar, that it is difficult for us to imagine how deeply E. affected men's minds before the dawn of astronomical science. To the ancients, they were without the order of nature—terrible presages of dire events; and at Rome, at one time, it was blasphemy, and punished by law, to talk publicly of their being due to natural causes. So strong a hold had this superstition on the popular mind, that even after it came to be generally believed that E. of the sun were caused by the moon coming betwixt us and that orb, E. of the moon were still referred to supernatural agency. When the moon was in eclipse, the people turned out and made a great noise with brazen instruments—the idea being, that by doing so they gave her ease in her affliction. According to some, Luna, when in eclipse, was in the pains of labor; according to others, she was suffering from the arts of wicked magicians. Similar notions have prevailed among all barbarian tribes. The Chinese, it is well known, imagine E. to be caused by great dragons trying to devour the sun and moon, and accordingly they beat drums and brass kettles to terrify the monsters into letting go their prey. Several stories are told of these popular superstitions being turned to good account by knowing persons; among which are those which represent Thales as bringing about peace between the Medes and Lydians; and Columbus, when in a great strait, procuring provisions from the natives of Jamaica through the prediction of eclipses.

Stars, planets, and the satellites of planets, may suffer eclipse. The principal E., however, are those of the sun and moon, called the solar and lunar eclipses. The transits of the lower planets over the face of the sun are partial solar E.; but solar E., properly so called, are those caused by the interposition of the moon between the sun and earth. Regarding solar E., it is observed that they happen always at the time of new moon, when the sun and moon are in conjunction, i.e., on the same side of the earth. In a partial eclipse, the sun's disk suddenly loses its circular form; it becomes indented on one side, the indentation slowly increasing for some time, and then diminishing until it disappears altogether. In a total eclipse, the indentation goes on increasing till the whole orb for a time disappears; after a short interval, the sun reappears again, passing through the same phases of obscuration in an inverse order. In an annular eclipse, the whole orb is obscured except a ring or annulus. Lunar E., again, it is observed, happen always at full moon, or when the sun and moon are in opposition, or on opposite sides of the earth, and are caused by the moon passing through the earth's shadow. Such E. are sometimes partial, and sometimes total, but never annular, and in their general phases they resemble those of the sun.

In speaking of E., we shall have occasion to use certain terms, which we shall now define. The *duration* of an eclipse is the time of its continuance, or the interval between immersion and emersion. *Immersion* or incidence of an eclipse is the moment when part of the luminary begins to be obscured; *emersion* or *expurgation* is the time when the luminary begins to reappear or emerge from the shadow. When the quantity of an eclipse is mentioned, the part of the luminary obscured is intended. To determine this part, it is usual to divide the diameter of the orb into twelve *digits*; and the eclipse is said to be of so many digits, according to the number of them contained in that part of the diameter which is obscured.

Having given this general explanation of the facts of observation on which the theory of E. turns, and of the language employed in speaking of them, we now proceed briefly to explain the theory itself, and how it is possible to predict the time of occurrence, and the duration and quantity of eclipses.

1. *Eclipses of the Moon.*—It has been said that these are caused by the moon passing through the earth's shadow. Before this explanation can be accepted, it must be shown that that shadow extends as far as the moon. This is easily done. Supposing

the earth to have no atmosphere, then the shadow is the cone marked in shade in fig. 1, whose apex is at O; and the question is, whether the distance OT from the apex to the earth's center exceeds the moon's average distance from the earth. Drawing TB, SA, from the centers of the earth and sun respectively, perpendicular to the line OBA, touching both spheres, and the line TC parallel to the line OBA, we have from the

similar triangles OTB, TSC, the proportion $OT : TB :: TS : SC$. Now, we know that TS, the (mean) distance of the sun, is equal to about 24,000 times TB; also, from the construction, $AC = TB$; and we know that $SA = 112$ times TB, whence it follows that $SC = 111$ times TB. The above proportion, then, gives $OT =$

216 times TB, since $\frac{24000}{111} = 216$ nearly. But the moon's average distance is only 60 times TB (the earth's radius). Hence it appears that the length of the earth's shadow is almost four times the average distance of the moon, and that the moon can enter it. Further, it is clear that, should it do so, it may be totally obscured; for it must enter at a point much nearer T than half the distance OT, which is 108 times TB; and everywhere within that distance it might be shown the breadth of the shadow is much greater than the moon's disk. But one consideration now remains to be stated to complete the proof of the theory of lunar eclipses. It was mentioned that they only occur at full moon, and we know that to be the only time when the earth is between the sun and moon, and so has a chance of throwing her shadow upon it. Why they do not occur every full moon, will be explained in treating of the prediction of eclipses.

In the foregoing explanation, we proceeded on the assumption that the earth has no atmosphere. If the assumption were correct, the earth's shadow would be darker and narrower than it is, and the phenomena of E. shorter in duration, but more striking. The effect of the atmospheric refraction (see REFRACTION) is to bend the rays which are incident on the atmosphere in towards the axis of the cone of the earth's shadow, those which pass through the lowest strata of the air being most refracted, and converging to a point in the line OT (see fig. 1), at a distance equal 42 radii of the earth from the earth's center. Accordingly, the moon, which, as we have seen, crosses the shadow at a distance of about 60 radii, never enters that part of it which is completely dark; thus, she never loses her light entirely, but appears of a distinct reddish color resembling tarnished copper—an appearance caused by the atmospheric refraction, in the same way as the ruddy color of the clouds at sunset. There is another reason why the phenomena of a lunar eclipse are less striking than, from the explanation given relative to fig. 1, might be expected. Every shadow

cast by the sun's rays necessarily has a penumbra, or envelope, on both sides of the half-shadow. In the case before us (fig. 2), suppose a cone having its apex O' between the sun and earth, and enveloping each of them respectively in its opposite halves, CO'C' and AO'A' (fig. 2). It is clear that from every point in the shaded part of the cone CO'C', and without the shadow BOB', a portion of the sun will be visible—and a portion only—the portion increasing as the point approaches either of the lines CB, C'B; and diminishing as it approaches the lines BO, B'O. In other words, the illumination from the sun's rays is only partial within the space referred to, and diminishes from its extreme boundary lines towards the lines BO, B'O. When, then, the moon is about to suffer eclipse, it first loses brightness on entering this penumbra; so that, when it enters the real shadow, the contrast is not between one part of it in shade and the other in full brilliancy, but between a part in shade and a part in partial shade. On its emersion, the same contrast is presented between the part in the umbra and the part in the penumbra. What we should expect on this geometric view of the earth's shadow, actually happens. From the breadth of the penumbra, it happens that the moon may fall wholly within it before immersion in the umbra commences; and so softly do the degrees of light shade into one another, that it is impossible to tell when any remarkable point on the moon's surface leaves the penumbra to pass into the umbra, or the reverse.

2. *Prediction of Lunar Eclipses.*—We said that lunar E. only happen at full moon. They do not happen every full moon, because the moon's orbit is inclined to the ecliptic, on which the center of the earth's shadow moves at an angle of $5^{\circ} 9'$ nearly. Of course, if the moon moved on the ecliptic, there would be an eclipse every full moon; but from the magnitude of the angle of inclination of her orbit to the ecliptic, an eclipse can only occur on a full moon happening when the moon is at or near one of her nodes, or the points where her orbit intersects the ecliptic. An eclipse clearly can happen only when the centers of the circle of the earth's shadow and of the moon's disk approach within a distance less than the sum of their apparent semi-diameters; and this sum is very small; so that except when near the nodes, the moon, on whichever side of the ecliptic she may be, may pass above or below the shadow without enter-



Fig. 1.

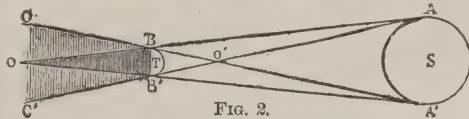


FIG. 2.

ing it in the least. The moon's average diameter is known to be $31' 25'' .7$, and from the *Nautical Almanac* we may ascertain its exact amount for any hour—its variations all taking place between the values $29' 22''$ and $33' 28''$. As for the diameter of the circle of the shadow, it is easily found by geometric construction and calculation, and is shown to vary between $1^\circ 15' 32''$ and $1^\circ 31' 36''$; and its value for any time may be found from the *Nautical Almanac*, to which value astronomers usually add $1'$ as a correction for its calculation proceeding on the assumption that the earth has no atmosphere. Starting from these elements, it is a simple problem in spherical trigonometry—which may be solved approximately by plane trigonometry by supposing the moon and the earth's shadow to move for a short time near the node in straight lines—to fix the limits within which the shadow and moon must concur to allow of an eclipse. Recollecting that the earth's shadow on the ecliptic is at the opposite end of the diameter from the sun, and that therefore as it nears one node the sun must approach the other—the sun and shadow being always equidistant from the opposite nodes—we find, from the solution of the above problem: 1. That if, at the time of full moon, the distance of the sun's center from the nearest node be greater than $12^\circ 3'$, there cannot be an eclipse. 2. If at that time the distance of the sun's center from the nearest node be less than $9^\circ 31'$, there will certainly be an eclipse. 3. If the distance of the sun's center from a node be between these values, it is doubtful whether there will be an eclipse, and a detailed calculation must be resorted to, to ascertain whether there will be one or not. Into the nature of that calculation we shall not attempt here to enter; suffice it to say that, knowing from the *Nautical Almanac* the true time of the sun and moon being in opposition, the true distance of the moon from the node at the time of mean opposition, with the true place of the sun at that time, as well as the moon's latitude, we may, by means of these elements, combined with the obliquity of the moon's path and her motion relative to that of the sun, not only fix whether there shall be an eclipse or not, but predict its exact magnitude, duration, and phases. It may here be mentioned, that before the laws of the solar and lunar motions were discovered with anything like accuracy, the ancients were able to predict lunar E. with tolerable correctness by means of the lunar cycle (see PERIOD) of 18 Julian years and 11 days. Their power of doing so turned on this, that in 223 lunations the moon returns *almost exactly* to the same position in the heavens. If she did return to *exactly* the same position, then, by simply observing the E. which occurred during the 223 lunations, we should know the order in which they would recur in all time coming.

All lunar E. are universal or visible in all parts of the earth which have the moon above their horizon, and are everywhere of the same magnitude, with the same beginning and end; and this universality of lunar E. is the reason why it is popularly thought, contrary to the fact, that they are of more frequent occurrence than solar eclipses. The eastern side of the moon, or left-hand side as we look towards her from the north, is that which first immerses and emerges again. The reason of this is, that the proper motion of the moon is swifter than that of the earth's shadow, so that she overtakes it with her east side foremost, passes through it, and leaves it behind to the west. It will be readily understood, from the explanations above given, that total E. and those of the longest duration happen in the very nodes of the ecliptic. But from the circumstance of the circle of the shadow being much greater than the moon's disk, total E. may happen within a small distance of the nodes, in which cases, however, their duration is the less. The further the moon is from her node at the time, the more partial the eclipse is, till, in the limiting case, she just touches the shadow, and passes on unobscured.

3. *Eclipses of the sun*, so called, are caused, as we have stated, by the interposition of the moon between the earth and sun, through which a greater or less portion of the sun is necessarily hid from view. In one sense, a solar eclipse might more properly be called an eclipse of the earth, caused by the moon's shadow falling upon it.

By a process similar to that used in ascertaining the length of the earth's shadow, it can be shown that the greatest value of the length of the moon's shadow is 59.73 semi-diameters of the earth; at the same time, we know that the least distance of the moon from the earth is about 55.95 semi-diameters. It follows that when a conjunction of the sun and moon happens at a time when the length of the shadow and the distance of the moon from the earth are, or are nearly, equal to the values above stated, the moon's shadow extends to the earth and beyond it. Should the shadow in these circumstances fall upon the earth, there will be a total eclipse of the sun at all places within it or over which it moves (fig. 3). If L be the moon, T the earth, and abL the moon's shadow cast by the sun, there will be a total eclipse of the sun at every point that is completely within the portion ab of the earth's surface. Again, the smallest value of the length of the moon's shadow may be shown to be 57.76 semi-diameters of the earth, and the greatest distance of the moon from the earth is 63.82 semi-diameters. Suppose the moon interposed between the earth and sun when these values concur, it is clear that the moon's shadow will fall short of the earth. In this case, the sun cannot be altogether hid from any point of the earth's sur-



FIG. 3.

face; but this case, or one approximate to it, is that in which there will occur an annular eclipse. In the figure, suppose O to be the apex of the shadow which falls short of the earth, and conceive the cone of the shadow produced earthwards beyond O into a second cone *Ocd*; then from every point within the section *cd* of the earth's surface, the moon will be seen projected as a black disk on the middle of the disk of the sun, the portion unobscured forming a ring or annulus of light. While in the two cases just described

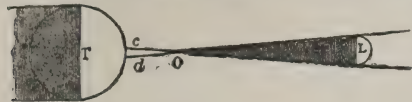


FIG. 4.

the eclipse is total or annular at places within *ab* or *cd*, it will be partial at other places; the moon will appear projected against a portion of the sun's disk, making a circular indentation. To ascertain the places at which the eclipse will be partial, we have merely to form the cone of the

penumbra of the moon's shadow in the manner explained in treating of lunar E.: at all places on the earth's surface within that cone there will be a partial eclipse. A simple calculation shows what is the observed fact, that the cone of the penumbra is not nearly large enough to embrace the whole of the face of the earth directed to the sun; in other words, solar E. are not universal, like those of the moon, i.e., they are not seen from all places that have the sun above their horizon at the time of the eclipse, which is the reason that though they are of more frequent occurrence than lunar eclipses, the latter are commonly supposed to occur more frequently.

If one could take up a position in space from which he could command a view of the whole face of the earth turned to the sun during a lunar eclipse, the phenomena which he would observe would be somewhat as follows. Marking the point of the earth first touched by the penumbra of the moon's shadow, he would observe the obscuration spreading therefrom over a wide and wider area as the penumbra advanced, till at last, supposing him to be viewing the case of a total eclipse, there appeared the umbral cone marking the earth with a dark spot. By and by, the whole penumbral shadow would be on the earth. The black spot would then appear to travel onwards with the motion of the shadow, and in its center, in a course determined by the composition of the proper motion of the shadow or moon, and the motion of rotation of the earth. Part of the globe would be free from the affection, and, in the course of time, the umbral spot would progress over different portions of the earth in succession, till at last it passed off the earth's surface, drawing after it the penumbral shadow. Could the spectator mark on the globe the various places affected by the shadow, with their degrees of shading, he would have a perfect chart of the course of the eclipse. The small belt of the globe traversed by the umbra would mark all places at which the eclipse would be total, while the degrees of shading over places adjoining that belt on both sides would indicate the magnitude of the partial eclipse as seen from them. The breadth of the belt traversed by the umbra, when the sun's distance is greatest and the moon's least, is estimated at about 180 m.; and in the same case the penumbra is estimated to cover a circular space of 4,900 m. in diameter, the eclipse happening exactly at the node. If the eclipse does not happen at the node, it is clear that the axis of the shadow must be inclined to the plane of the ecliptic, that the shadow will be cut obliquely, and therefore that the part of the earth in shade will be oval. It may here be stated that astronomers usually calculate beforehand the motion of the shadow over the earth's surface, and prepare charts to exhibit its motion. Such a chart an observer from a position outside the earth would have it in his power to make from observation.

Of the commoner phenomena attending an eclipse of the sun, as regards the appearance of that luminary, nothing need be said; they are perfectly analogous to those of lunar E., except in the case of the eclipse being annular. There are other appearances, however, attending an eclipse of the sun, especially when it is total, that are very remarkable. The most instantaneous darkening of the orb of day, more particularly when it is unlooked for, is calculated to impress a spectator with vague terror; even when expected, it fills the mind with awe, as a demonstration of the forces and motions of the mechanism of the universe. The sudden darkness, too, is impressive from its strangeness as much as from occurring by day; it resembles neither the darkness of night nor the gloom of twilight. The cone of the moon's shadow, though it completely envelops the spectator, does not, as we have explained, inclose the whole atmosphere above his horizon. The mass of uninclosed air accordingly catches the sunlight, and reflects it into the region of the total eclipse, making there a peculiar twilight. Stars and planets appear, and all animals are dismayed by the dismal aspect of nature.—See Mahoud-Bey's report of the total eclipse of July, 1860. Mr. Warren De la Rue, who was one of an expedition of scientific men who went to Spain to witness the same eclipse, gives the following account of the aspects of nature near the time of totality: "When the sun was reduced to a small crescent, the shadows of all objects were depicted with great sharpness and blackness, reminding one of the effects of illumination with the electric light. The sky at this period assumed an indigo tint, and the landscape was tinged with a bronze hue."—*Athenæum*, 1860, vol. ii., page 259. At totality, there was still light enough to enable the observer to draw without the aid of his lamp, while the sky near the sun presented a deep indigo, and thence passed through a sepia tint to red and brilliant orange near the horizon. It must be said, however, that the strange appearance

here recorded is exceptional, and probably not such as could ever occur in our latitude. There is one set of phenomena attending total E. of the sun, which are at once strange and invariable, and the causes of which cannot be said to be yet fully understood. As long as the total eclipse lasts, there appears round the sun and moon a luminous corona, while at its base, and projecting beyond the dark edge of the moon, appear very brilliant prominences, generally of a red color. These prominences were first observed during the total eclipse of 8th July, 1842; but they are found to be constant attendants on E., and methods have been invented of rendering them visible at any time without the interposition of the moon. The spectroscope reveals them to consist mainly of hydrogen gas in an incandescent state, and a comparatively narrow belt of the same color and substance runs round the whole circumference of the sun. The prominences are sometimes seen to shoot up like flames, in wild fantastic shapes, with incredible velocity, and to the height of tens of thousands of miles.

In the eclipse of 1860 the light of the corona was a silvery white, and it extended beyond the moon's limb about eight tenths of her diameter. The corona consisted first of a bright ring of about 2' wide, and then an exterior and fainter ring of about 3', beyond which, for a mean distance of about 2', extended a glory of small rays—the whole corona extending to 7' beyond the moon's limb. From the corona, at intervals, projected individual rays of remarkable size, and five in number: one of 9' length; another of 14', and shaped like the point of a star; a third, sabre-shaped, and extending 28'; a fourth, 28'; and a fifth, 10'. These individual rays are very differently described by different observers of the same eclipse, and are not well accounted for. The diffused light of the corona is believed to be caused by an immense extension of the gases forming the red envelope, only in a cooler and rarer condition.

4. *Prediction of Solar Eclipses.*—The period of 18 Julian years 11 days, referred to in treating of the prediction of lunar E., applies equally to solar E. with lunar; but the ancients, who understood that fact, could find no law of recurrence of solar E. within that period, so as to predict them. The reason of the failure is obvious; for though solar E. recur in a fixed order within the cycle, they are not visible at the same places on their recurrence as when first observed. By modern methods, however, E. of the sun may be predicted, with all their circumstances of time and places of observation, with the most perfect certainty. We shall not, however, attempt to explain what these methods are; suffice it that they resemble those already generally described as applied in the case of lunar E. At the time of a solar eclipse, the sun and moon are in conjunction; they are also in or near the same node; and no eclipse can happen if they are further than 17° from the node, or if the latitude of the moon, viewed from the earth, exceeds the sum of the apparent semi-diameters of the sun and moon. When within these limits, it is a problem of numbers and of spherical trigonometry to ascertain the nature of the eclipse, if any, which will happen.

The number of eclipses of the sun and moon together in a year cannot be less than two, or more than seven; the most usual number is four, and it is rare to have more than six. The explanation of the limitation of the number of E. is connected with the fact, that the sun passes by both nodes but once in a year, except in the case of his passing one early in the year, in which case, owing to the recession of the moon's nodes, he will again pass it a little before the end of the year. From the smallness of the cone of the moon's shadow, total solar E. are extremely unfrequent in any one place, compared with the frequency of their actual occurrence. At Paris there was only one total eclipse of the sun in the 18th c., that of 1724, and there will not be another till near the close of the 19th century. In London, not one total eclipse was witnessed during the 575 years, 1140–1715. See *illus., SOLAR SYSTEM*, vol. XIV.

ECLIPSES OF THE SATELLITES. See SATELLITES.

ECLIP TIC is the name given to the great circle of the heavens round which the sun seems to travel from w. to e., in the course of a year. It took its name from the early observed fact, that *eclipses* happen only when both bodies are in or near this path. A little attention about sunset or sunrise shows that the sun is constantly altering his position among the stars visible near him, leaving them every day a little further to the w.; and that this motion is not exactly e. and w., or parallel to the equator, becomes also evident by observing that the sun's height at mid-day is constantly altering. It is further observed that, twice a year, about Mar. 21 and Sept. 23, the sun is exactly on the equator. The two points of the equator on which the sun then stands are the equinoctial points, and are the intersections of the equator and ecliptic. Again, there are two days in the year on which the sun reaches his greatest and his least mid-day elevation: the first is the 21st of June; the second, the 21st of December. On these days, the sun has reached his greatest distance from the equator either way, and the points in his course where he thus seems to pause or halt in his retreat from the equator are called the solstices (*solis stationes*). These four points are distant from one another by a quadrant of the circle, or 90°. Each quadrant is divided into three arcs of 30°, and thus the whole ecliptic is divided into 12 arcs of that length, called signs of the zodiac (q.v.). These arcs or signs have been named after constellations through which the ecliptic passes. As the equinoctial points are not fixed, but recede yearly westwards about 50 seconds, and in a century about 1° 23', the same constellations and signs that coincided

when the division of the ecliptic took place, no longer coincide. The constellation of the ram, for instance, which originally stood in the first arc or sign, now stands in the second, every constellation having advanced forward 30° , or a whole sign. Modern astronomers therefore pay little attention to these constellations and signs, but count longitudes from the existing spring equinoctial point from 0° to 360° .

Not only do the points change where the ecliptic and equator cross each other, but the angle of their inclination, called the obliquity of the ecliptic, is also variable. It is at present nearly $23\frac{1}{2}^\circ$, and is diminishing at the rate of about 50 seconds in a century. Were it to go on diminishing always, the ecliptic and the equator would at last coincide, and the earth would then have an everlasting spring. The decrease, however, has a limit; the obliquity oscillates between two definite bounds, which it can never pass. It has been calculated that it was at its greatest 2,000 B.C., and was then nearly $23^\circ 53'$. Since then, it has been decreasing, and will continue to do so till about the year 6,600 A.D., when it will be at its least, and about $22^\circ 54'$. These slight alterations cannot sensibly affect the seasons.

The physical cause of this change of the obliquity is the action of the other planets, especially Jupiter, Mars, and Venus, on the mass of the earth. The fact of the change was known to astronomers in very ancient times; Herodotus mentions an old tradition of the Egyptians, that the ecliptic had formerly been perpendicular to the equator—a notion into which they were most probably led by observing, for a long series of years, that its obliquity was constantly diminishing. There can be little doubt that the Chaldeans arrived at the epoch of 403,000 years before the entry of Alexander into Babylon, to which they proudly referred for their first astronomical observations, by computing the time when the ecliptic was perpendicular to the equator, on the supposition of its obliquity diminishing $1'$ in 100 years. Though it was not till after the discovery of the law of gravitation that the change on the obliquity could be explained, yet that it was changing was believed in by many astronomers, although some doubted whether the differences in the values at different times were not due to errors of observation. The earliest known measure of the obliquity of the ecliptic was made by Tcheou Kong, the regent of China. Among the western nations, the earliest measurements were made by Pytheas and by Eratosthenes.

ECLOGUE, usually designates a pastoral poem in which are related the loves and adventures of shepherds and shepherdesses in some ideal scene and period. The name is sometimes applied to Virgil's *Bucolics*. Spenser is perhaps the leading English poet in eclogues—a species of composition now out of date.

ÉCOLE POLYTECHNIQUE is one of the most celebrated military academies in France. In 1793, all the public establishments in Paris were in a convulsed state, owing to the revolution. In 1794, M. Lamblardie, director of the *Ponts et Chaussées*, proposed the establishment of an *École Centrale des Travaux Publics*, to educate young men for military, naval, and civil engineering. Monge and Carnot favoring his plan, it was carried out, and a school established at the palais Bourbon. The first list of professors comprised names which afterwards acquired European celebrity—including those of Lagrange, Prony, Monge, Hachette, Hassenfratz, Fourcroy, Vauquelin, Berthollet, Chaptal, Pelletier, Guyton-Morveau, and Merimée. In 1795, the name was changed to E. P.; many alterations were made in the organization; artillery studies were included in the course; and the pupils were ordered to wear a uniform. When Napoleon went to Egypt, 40 pupils from the E. P. accompanied him, many of whom greatly distinguished themselves. Napoleon made the organization of the school more strictly military in 1804, to identify it more fully with the army. The school was dissolved in 1816, again in 1830, and again in 1832, on account of the impetuous way in which the pupils mixed themselves up with the political disturbances of those years; but as the school suited the military genius of the French nation, it was re-established on each occasion, after the restoration of tranquillity. Candidates can be admitted only by competitive examinations, which take place yearly. A proclamation from the war office, made public before the 1st of April, informs intending competitors of the subjects on which they are to be examined, and the time when the examinations begin. To be eligible as a candidate, the youth must be French, and must be more than sixteen, and less than twenty years of age before the 1st of Jan. following; but soldiers are admissible up to the age of twenty-five, provided they can give proof of two years of service in the regular army. The cost of board alone is 1000 francs (nearly £42) a year. A complete course of instruction lasts for two years; when the pupils who have satisfactorily passed the final examinations have the privilege of choosing, from among the various public services supplied from this school, the particular branch they wish to enter, such as artillery, engineers, the staff, the department of telegraphs, or some of the other government monopolies. The school was reorganized by a decree of the 15th April, 1873.

ECONOMY, a socialist town and borough, in Beaver co., Pa., on the right bank of the Ohio, about 17 m. below Pittsburg. The settlement was planted in 1825 by immigrants from Germany. The inhabitants own everything in common—3,500 acres of land, upwards of 100 houses, a church, a school, a museum, and manufactories of wool, cotton, and silk. Pop. '90, town 1029, borough 413. See HARMONISTS.

ECONOMY, POLITICAL. See POLITICAL ECONOMY.

ÉCORCHÉ. A figure in which the muscles are represented, stripped of the skin, for purposes of artistic study, is called by the French an *E.*, and from them we have borrowed the term. From a portion of the figure the upper muscles are also removed, so as to exhibit those which lie nearer to the bone. It is not uncommon to represent the *E.* in action, in the form of the fighting gladiator. The first person who did so was Salvage, a French artist and anatomist. To render the studies of pupils more complete, Salvage had this figure engraved in all the points of view, and more or less denuded of flesh, till at last it was little more than a skeleton, the only muscles represented being those which immediately cover the bones. Figures of this kind can now be procured both in plaster and papier-mâché.

ECOSSAISE, a dance of Scottish origin. It was written in 3-2 or 2-4 time, and played upon the bag-pipes. The modern ecossaise is a species of contredanse. See **COUNTRY DANCE**. Schubert wrote several ecossaises for the pianoforte.

ÉCOUTES (Fr. *écouter*, to listen), in military operations connected with siege-works, are listening-places. They are small galleries, excavated at regular distances, and going out beneath and beyond the glacis, towards the lines and batteries of the besiegers. Their purpose is, to enable the garrison to hear and estimate the works being carried on by the sappers and miners of the enemy.

ECRASEUR, the name of a long steel instrument, invented some years ago by a distinguished French surgeon, M. Chassaignac, and consisting of a fine chain, which, passed round any structure—as the base of a tumor, for example—gradually constricts it, and finally crushes its way through it by means of a screw or rack for tightening it, which is worked at the end of the handle. The advantage of this instrument over the knife is, that it causes little or no bleeding, the torn vessels spontaneously contracting and closing. It is specially applicable to cases of cancer of the tongue, piles, polypi, and various kinds of tumors. When a solid mass—as, for example, a considerable portion of the side of the tongue—is to be removed, the chain is sometimes pressed through the center, and made to cut two lines successively in the form of a V, in which the diseased structure is included. As the pain which is caused by this instrument is very great, the patient should be placed completely under the action of chloroform.

ÉCRASITE. See **EXPLOSIVES OF HIGH POWER**.

ECSTASY (Gr. *ekstasis*, a transposition, a change of situation or condition; applied to the mind in the sense of a state in which it is altered or fundamentally changed in character by some absorbing emotion), a word applied to those states of mind, which, without amounting to insanity (q.v.), in respect of the temporary character of the affection, are marked by mental alienation, and altered or diminished consciousness. A person in ecstasy may be violently moved, or completely passive; convulsed, or rigid, or flaccid in all the limbs; silent, or uttering unmeaning or excited language, or assuming the character of a prophet or inspired person; having, or not having intelligence of what is going on around him. The varieties are infinite, because this morbid state of the mind is nothing more in reality than the fixing of it in a particular attitude, as it were, in connection with an overmastering idea, emotion, or sensation, which causes all other external phenomena to be disregarded. Perhaps the most common form, or, at all events, that which is best known, is religious ecstasy closely allied to monomania and religious delusion of every kind; often simulated, but also occurring as a real disease, as in the case of those “struck” in revival meetings, and in the older histories of the conversions of Cambuslang, the *convulsionnaires* of St. Médard, and the epidemics of religious excitement mentioned under dancing mania (q.v.). It is also common to speak of the ecstasy of terror, and the expression is correct in exaggerated cases, where fear completely paralyzes both the consciousness and the power of motion and expression; so also there is an ecstasy of joy, of love of hate, of meditation; and in some physical states as catalepsy (q.v.), hysteria (q.v.), mesmerism (q.v.), a true ecstasy is one of the phenomena, inasmuch as the proper consciousness of the individual is temporarily abolished, or so much changed in character as to lead almost to the loss of the sense of personal identity. Some of the cases of presumed double consciousness (q.v.) are no doubt of this kind; and generally the same may be said of the state of the mind in many dreams and visions, and also in somnambulism (q.v.). A striking picture of this form of ecstasy is the well-known sleep-walking scene in *Macbeth*, where the lady’s mind is so completely preoccupied with the supposed blood stain on her hands, that though her eyes are open, we are told that “their sense is shut,” and the mind is also excluded from all the ordinary avenues of communication.

ECTHYMA is a pustular disease of the skin, in which the pustules often reach the size of a pea, and have a red, slightly elevated, hardish base. In the course of two or three days after the appearance of the pustule, it is replaced by a scab, which adheres firmly to the base, and is somewhat concave. On its removal, a deep red mark, a new scab, an ulcer, or a healed scar remains. The disease may be acute or chronic. The acute form is ushered in by slight constitutional, not amounting to febrile, symptoms, and by a burning or pricking pain at the seat of the eruption, which is usually confined to the neck and shoulders. The disease runs its course in 10 days or a fortnight. In chronic ecthyma, the pustules which follow in crops (often for several months) are

usually scattered over the extremities. This form of eruption indicates a low state of the system. It sometimes follows the acute disease, and not unfrequently is a tertiary symptom of syphilis. Pustules, which in no respect seem to differ from those of ecthyma, are produced by various local irritants. Thus the affection of the hands, popularly known as the *grocer's itch*, is produced by the irritation of brown sugar, perhaps by the *acari* which are so often present in it. Stone-masons are said occasionally to suffer from a similar disease. With regard to *treatment*, the acute form would in most cases doubtless disappear in the course of a fortnight, if left entirely to itself; but as the bowels are usually disordered, an occasional alterative aperient, as a few grains of gray powder with a little rhubarb, may be prescribed, and tepid water applied locally gives great relief. The patient should, moreover, be kept on a moderately good, nutritious diet. In the chronic form of the affection, a meat diet and the use of wine or porter are essential; while tonics, such as a combination of bark and nitric acid, are called for. Tepid baths are often useful, and if there is sleeplessness, an opiate should be taken at or shortly before bedtime.

ECTOZO'A (Gr. *ektos*, without, and *zoos*, living), a term which has been introduced, as in contradistinction to *Entozoa*, to designate those parasitic animals which live upon the external parts of other animals, as lice, ticks, etc. Such also are many of the entomostracous crustaceans, parasitic upon fishes. It is a question of much importance, not yet satisfactorily answered, if any of these creatures are the causes of diseased states, in connection with which they are sometimes found in particular abundance, or if their presence in unusual numbers is to be ascribed to disease previously existing.

ECTYPUM, a cast in relief of an ornamental design, produced from a mold.

ECUADOR, the Spanish term for *equator*, is the name of an independent state of South America, extending from lat. 1° 23' n. to 4° 45' s.; and from long. 73° to 81° 20' west. It measures, therefore, from n. to s. fully 500 m., and from e. to w. nearly 700, presenting an area of about 118,630 sq. miles. It is bounded on the north and east by the Republic of Colombia, on the s. by Peru, and on the w. by the Pacific ocean. Toward the e. it is drained by the Amazon, which receives all the rivers that fall down the eastern slopes of the Andes, while the country w. of the Andes is drained chiefly by the Mira, the Esmeralda, and the Guayaquil—the last named being more available for navigation than any other on the same coast of South America. The country is traversed nearly in the line of a meridian, by the two ranges of the Andes, which, alternating between union and separation, sometimes run into what are called knots, and sometimes inclose, at great elevations, plateaus or table-lands. Among these last, ranging from s. to n., the most important are those of Cuenca, Hambato, and Quito—their respective heights above the sea being, in feet, 8,640, 8,860, and 9,543. Lofty as these plateaus or table-lands are, they are beset, nay almost shut out from the world, by pinnacles of occasionally more than equal altitude above their own level. Of these the most remarkable are Chimborazo (q.v.) and Cotopaxi (q.v.).

The population of Ecuador in 1822, when it was made a part of the Columbian Confederacy, was estimated at 880,000. There is no regular census, but official statements respecting the population have been made from time to time, and on the basis of these, for the year 1889, it is estimated at 1,271,861, of whom the larger portion, probably about 60 per cent. are Indians, and only about 100,000 are whites, the descendants of Europeans. About 300,000 belong to the class called Mestizos, a mixed race, the offspring of Indians and Europeans. The number of illiterates is very large, it being estimated that hardly 100,000 can read and write. The backward condition of the Indians has led the government to treat them virtually as wards of the nation, although by the constitution distinctions of rank and race are not admitted. By a decree of 1896, however, the Indians were rendered exempt from paying tribute, and were admitted to citizenship. The present constitution of Ecuador was adopted in 1884, and modified in 1887. It seems to have been modeled on that of the United States of North America. The executive is vested in the president, elected for four years, and there is a congress of two houses. The principal exports are cocoa, coffee, ivory nuts, india rubber, and straw hats; the imports are cotton and other fibres, and provisions. The leading nations importing into Ecuador were, in 1893, in the order of their importance, Great Britain, France, United States, and Germany. In the same year France derived a larger amount of exports from Ecuador than any other nation, and after her, in order of importance, were Germany, Great Britain, United States, and Spain. The exports for 1895 were 11,000,000 sucres, and the imports 10,000,000. The estimates for 1896 place the exports at 12,000,000 and the imports at 9,000,000 sucres, the disturbed condition of the country having caused a decrease in imports. In regard to the financial condition of Ecuador, it may be noted that there were two well managed banks of issue in 1896, with a combined capital of 7,000,000 sucres, and that there were two or three other banks known as mortgage banks. The unit of value is the sucre, of silver, or paper redeemable in silver. It is of about the same weight and fineness as the United States silver dollar. There are no gold coins in circulation. The revenue from import and export duties, and internal taxes on salt, tobacco, and liquors, was about 7,000,000 sucres, from June, 1895, to July 30, 1896. Agriculture is in a very primitive condition. The soil is extremely fertile, but the lack of railroad connections with the coast, and of wagon roads, makes it profitable to till only a small portion. Gold, silver, and coal exist in various parts of the country, but they have not been profitably developed. Education is not general among the masses, only about 20 per cent. of the adults being

able to read and write. The army consisted, in 1896, of about 4,000 effective men, and the navy of two small boats. See *Bulletin No. 64*, of the Bureau of American Republics, and the *Statesman's Year Book* for 1897.

ECUMENICAL (Gr. *oikoumenikos*), i. e., universal, a term applied to ecclesiastical councils, regarded as representing the whole Christian church, or the church of the whole world (*oikoumenē*), and to the orthodox or Catholic church, regarded as opposed to heretical and merely local sects. The Roman Catholics claim the designation as appropriate to their own church. It is a title of patriarchs, archbishops, and ecclesiastical superintendents of provinces.

ECZEMA (from a Greek verb, "to boil out"), an eruption of small vesicles on various parts of the skin, usually crowded together, with little or no inflammation around their bases, and unattended by fever.

EDAM, a t. in North Holland, lies 12 m. n. e. from Amsterdam. It has seven entrances, and lies within a green dyke, ornamented by two rows of elm-trees. There is an extensive trade in wood and cheese. The principal industries are ship-building, rope-spinning, sawing wood, tanning leather, etc. There are Lutheran, Baptist, Roman Catholic, and Reformed churches, one of the latter having beautiful painted windows. In '91, pop. 6424.

ED'DA. There are two works which bear this title—the *Edda Sæmundar hins Froða*, or Edda of Sæmund the wise, and the *Edda Snorra Sturlusonar*. The former and older of these is a collection of the most ancient mythological and heroic Scandinavian songs, the date of whose composition may probably be referred to different periods between the 6th and 8th centuries. These songs, which are supposed to have been collected and arranged by Sæmund Sigfusson, surnamed Froði, an Icelandic priest, who was born in 1054, and died in 1133, were discovered and first brought before the notice of European scholars in 1643, by Brynjolf Sveinsson, bishop of Skalholt, who applied to them the name of Edda, or "grandmother." This collection was published entire at Stockholm, 1818, by A. A. Afzelius, after the text of Prof. Rask; and at Copenhagen, in 1787–1828, with a Latin translation, glossaries, etc. The third volume of this edition, which was completed by Prof. Finn Magnussen, consists chiefly of a very learned and copious lexicon mythologicum by the editor. Complete editions of the text of this E. were also published by Munch and Möbius, but all former editions have been superseded by the editions of Prof. Bugge of Copenhagen (1867), and of Svend Grundtvig (1868–74). Hildebrand's text (1876) is founded on theirs. Simrock made a German translation of both Eddas in 1851; and both Ettmüller and the brothers Grimm have translated a part of Sæmund's Edda. The Snorra Edda is a prose composition, and treats of Scandinavian mythology and of the language and modes of composition of the ancient skalds. As the name implies, it is referred to Snorri Sturlesson (q. v.), the learned author of the *Heimskringla*, who was born in Iceland in 1178, and died by assassination in 1241, on his return from Norway, where he had lived in the capacity of skald or court-poet. This E. was first published by P. J. Resen in 1665, under the title *Edda Islandorum An. Chr. mcccv. Conscripita per Snorronem Sturla*, etc. A complete edition of the prose E., and the most copious of all, was published at Stockholm by Prof. Rask in 1818. The trustees of the Arna-Magnæan legacy in Copenhagen have published an elaborate edition, with a Latin translation and notes; and a German edition of both Eddas, with glossary, etc., was published in 1859 by Lüning. A complete English translation of the poetical E., by Ben. Thorpe, was published in 1866. The best English translation of the mythological part of the prose E. is found in a translation of Mallet's *Northern Antiquities*, edited by Blackwall (1847). See also the translation of R. B. Andersen (1880).

ED'DOES. See Cocco.

EDDY, a co. in e. central N. Dakota, formed 1885 from part of Foster; 648 sq. m.; pop. '90, 1377. It is drained by the James and Sheyenne rivers and has a fertile soil. Co. seat, New Rockford.

EDDY, CLARENCE, American musician, b. in Greenfield, Mass., June 23, 1851. He studied under Dudley Buck in Hartford, and counterpoint under August Haupt, and the pianoforte under A. Loeschhorn in Leipsic. In 1894 he was made organist of the First Congregational Church in Chicago, where he became director of the Hershey School of Musical Art in 1876. Mr. Eddy has given many organ recitals in this country and in Europe. He has composed organ music, translated Haupt's *Counterpoint, Fugue, and Double Counterpoint* (1876), and published *The Church and Concert Organist*, etc.

ED DYSTONE, a group of gneiss rocks, daily submerged by the tide, in the English channel, 9 m. off the Cornish coast, and 14 m. s. s. w. of Plymouth breakwater. The rocks lie in lat. 50° 10' 54" n., and long. 4° 15' 53" e., and have 12 to 150 fathoms water around. The frequent shipwrecks on these rocks led to the erection of a light-house on them by Mr. Winstanley, 1696–1700. It was a wooden polygon, 100 ft. high, with a stone base; but a storm in 1703 completely washed it away, with the architect. Another light-house was built, 1706–9, also of wood, with a stone base, and 92 ft. high, by Mr. Rudyerd, a silk-mercator. This erection was burned in 1755. The next building, known as the Eddystone light-house, and noted for its strength and the engineering skill it displayed, was constructed by Mr. Smeaton in 1757–59, on the model, it is said, of the trunk of the oak-tree. It stood on the sloping side of one of the rocks, and was built of blocks, generally one to two tons weight, of Portland oolite, encased in granite, the granite dove-

tailed into the solid rock. The whole formed a circular tower 85 ft. high; the base was 26½ ft. diameter, and had 13 ft. of solid masonry on it. As the rock was undermined by the waves, it became necessary to take down the light-house, which was rebuilt 1879-82 on another part of the reef by Sir James Douglass, F.R.S. Its dioptric apparatus gives, at an elevation of 133 ft., a light equal to 159,600 candles, visible in clear weather to a distance of 17½ miles. See LIGHT-HOUSE.

EDELWEISS (noble-white), a perennial plant, *gnaphalium leontopodium*, belonging to the composite family; found in Switzerland, the Tyrol, Carinthia, and Alpine Austria generally, and Siberia. It bears terminal tufts of star-shaped white flowers, surrounded by woolly bracts, and sage-green leaves. Its notoriety is by reason not of its beauty, but of its scarcity, and the supposed difficulty of obtaining it, in its elevated haunts. In Swiss poetry, and legend, the peasant proves his love for his lady by risking his life to bring her the flower; see Auerbach's pathetic story, *Edelweiss*. This plant is so rare in Switzerland that several cantons protect it by law.

EDEN ("Delight"), according to the Scriptures, the first residence of man. The description given of it in the book of Genesis is brief, obscure, and in appearance legendary. The allegorical theory will be noticed under Fall (q.v.). In general, however, scholars have preferred to understand the story literally, and to believe that the writer or writers of it meant it to be so understood; but they have not, therefore, been unanimous as to the historical reality, or even the geographical position of Eden. The difference in their modes of apprehending the contents of the Hebrew Scriptures has manifested itself in this as in other *veritate questiones* of biblical criticism. Josephus and several of the fathers conceived that Eden was a term denoting the entire region between the Ganges and Nile; Calvin, Huet, Bochart, Wells, etc., have, with slight differences of detail, concluded in favor of Kornah in Babylonia, not far from the Persian gulf; Reland, Calmet, Hales, Faber, J. Pye Smith, in favor of Armenia, near the sources of the Tigris and Euphrates; Le Clerc, in favor of the region near Damascus; while the modern German school of biblical critics, convinced that the Hebrew account is traditional, and, in its present form, of very late composition, and impressed, besides, with the vast antiquity of the far east, have, almost without exception, turned their eyes in that direction, and sought the cradle of the human race in Bactria or Cashmere, or the region lying to the n. of it, a part of which is to this day called Audyana, the "garden." It may also be mentioned that the Mohammedans believe E. to have been in one of the seven heavens—some say the moon—and that the expulsion from paradise consisted in Adam being cast down upon the earth after the fall. It is useless seeking to identify the river system of E. with anything known at present. There is no river on the face of the globe of which the Euphrates and Tigris (Hiddekel) are separate "heads" (whether this means "sources" or "channels"), as they are said to be in the 2d chapter of Genesis, for, as maj. Rennell has shown, although the Euphrates and Tigris *now* unite, for a short space on their way to the Persian gulf, yet, until the time of Alexander the great, they kept entirely distinct courses; and therefore it has been assumed that the "deluge" completely altered the physical character of the region denoted by the term Eden. This was Luther's notion, to which, however, it has been objected, that the narrative in Genesis is so worded as to convey the idea that the countries and rivers spoken of were still existing in the time of the historian. Besides, the science of geology has thrown so much doubt on the universality of a deluge so late as the period assigned to Noah, that it is hazardous to argue on the hypothesis of any extensive physical changes having taken place since the first appearance of man on the planet; at least, if that be dated only some 6,000 years back. It will thus be seen that the question of the locality of E., or of the exact sense in which the Mosaic narrative is to be understood, is involved in inextricable mystery; and it has become a general opinion, that the spiritual significance of this primeval story is what principally concerns Christians—an opinion which derives force from the total silence of the New Testament in reference to the subject.

EDENTATA (Lat. toothless), an order of *mammalia* established by Cuvier, and generally received by naturalists. Cuvier remarks, that "although brought together by a purely negative character," the E. have, nevertheless, "some positive mutual relations, particularly in the great claws which encompass the ends of their toes, and which more or less approximate to the nature of hoofs; also in a certain slowness or want of agility, obviously arising from the peculiar organization of their limbs." He included among them, however, the *monotremata*, which, although so few in number, are now generally separated, on account of the very important differences of organization which characterize them. The remaining E. are divided into two tribes—1. *Tardigrada* (slow-paced), containing only the sloths; and, 2. *Effodentia* (diggers), containing armadillos, pangolins, ant-eaters, etc. The ant-eaters and pangolins are the only E. that are absolutely destitute of teeth; but none of the order have any teeth in the forepart of their jaws, and their teeth are comparatively imperfect in structure, being destitute of enamel and distinct roots. The sloths alone subsist on vegetable food, the rest chiefly on insects or on animal substances in a decaying state. The whole number of existing species of E. is not great.

EDESSA (modern name, *Urfah*, or *Orfa*), a very ancient city, on the river Daisan, in the n. of Mesopotamia, 78 m. s.w. of Diarbekir, although the Christian or Mohammedan legend, ascribing its foundation to Nimrod, or Khabiba, a female contemporary of Abraham, is unworthy of any credence. With the conquest of Persia by the Greeks,

the history of E. first becomes clearer. Seleucus, in particular, is said to have done much for the aggrandizement of the city. Christianity was introduced into E. at an early period. In the reign of Trajan, the place was made tributary to Rome, and in 216 A.D., became a Roman military colony, under the name of *Colonia Marcia Edessenorum*. During this period its importance in the history of the Christian church continued to increase. More than 300 monasteries are said to have been included within its walls; it was the seat of Ephraim Syrus and his school, and played an important part in the Arian and other controversies. With the extension of the religion of Islam, E. fell into the hands of the Arabian caliphs. Christianity declined, and wars at home and abroad during the caliphate, destroyed likewise its temporal splendor and prosperity, till, in 1040, it fell into the possession of the Seljuk Turks. The Byzantine emperors succeeded in recovering E., but the viceroy contrived to make himself independent. He was, however, hard pressed by the Turks, and this rendered it easy for the crusader Baldwin, the brother of Godfrey of Bouillon, to gain possession of the city (1097 A.D.), and make it the capital of a Latin principality, and the bulwark of the kingdom of Jerusalem. Under the Frankish princes, E. held out valiantly against the Mussulmans, till at length Zengi, ruler of Mosul, succeeded in taking the town and citadel in the year 1144, when all the Christian churches were converted into mosques. An attempt made by the inhabitants to throw off the Turkish yoke, completed the ruin of E.; the Edessenes were defeated by Nur-ed-din; and all who were not massacred, were sold as slaves. After many vicissitudes, in the course of which E. fell successively into the hands of the sultans of Egypt, the Byzantines, the Mongols, Turkomans, and Persians, the city was finally conquered by the Turks, and has ever since formed a portion of the Turkish dominions. On its site stands the modern city of *Orfa* or *Urfa*, with an estimated population of 55,000, of whom 40,800 are Mohammedans and 13,800 Christians. At present, E. has numerous mosques and bazaars; manufactures of cotton goods, goldsmiths' wares, and morocco leather, commerce in British manufactures obtained by way of Aleppo, and a large trade in corn, etc., with Syria. E. is regarded by the easterns as a sacred city, because they believe it to have been the residence of Abraham.

EDESSA, formerly known as *Ægæ*, the ancient capital of Macedonia, 46 m. w. of Thessalonica, at the head of a defile commanding the approaches from the sea-coast to the interior. It was the original residence of the Macedonian kings, and was the burial-place of the royal family long after it ceased to be the seat of government. In Edessa Philip II. was murdered by Pausanias, 336 B.C. The greater Alexander was buried at Memphis, but Edessa remained the royal burial-place, and when Pyrrhus occupied the place, the royal tombs were plundered by his Gallic mercenaries. The modern city of Vodena is built on the site of Edessa, and some remains of the ancient buildings are preserved.

EDFU, or *EDFOU* (Egypt. *Hut*; anc. *Apollinopolis Magna*), a town of upper Egypt, near the left bank of the Nile. It contains the ruins of the temple of Horus, one of the most perfect examples of Egyptian architecture that remain. The date of its foundation is uncertain, but the inscriptions that cover its walls show that the building in its present shape dates from the period of Ptolemy. Some authorities state that the builder was Ptolemy III. (237 B.C.) and that the work was completed 95 years later in the reign of Ptolemy IX. The entrance is by a gateway between two massive pylons over 100 feet high and covered with inscriptions. This entrance leads into a court, enclosed by a colonnade of 32 pillars, each with its own design. Back of this lies the hypostyle hall, with a roof supported by 18 columns, and then comes a second hall which opens into the vestibule of the sanctuary. In the passage around the sanctuary are several small chambers. The walls and ceilings are inscribed with various legends; among them that of the winged sun disc, telling the story of Horus, who was the tutelary deity of Edfu, and who is described as fighting the enemies of the god Ra, having assumed the form of a winged disc. The narrative represents him as victorious, typifying the victory of good over evil. Incidentally the story illustrates the Egyptian practice of ascribing the names of places and things to divine origin. Thus it makes the god Thoth exclaim, "This is a stabbing of my foes," and goes on to say that the nome in which Edfu was situated, was called "stabbing" (*Deb*) from that day. The interior of the temple court was formerly filled with rubbish and occupied by wretched dwellings, but early in the sixties, Mariette, by permission of the Khedive, cleared away the debris. The estimated population of modern Edfu is 5800. Its manufactures are cotton cloths, and a kind of earthenware similar to the ancient Egyptian pottery. See Brugsch, *Reiseberichte* p. 225; Lepsius, *Egypt and Ethiopia*, p. 117; and Wiedemann, *Religion of the Ancient Egyptians* (1897), p. 69.

EDGAR, a co. in e. Illinois, on the Indiana border, drained by affluents of the Wabash and intersected by the Cleveland, Chicago, Cincinnati, and St. Louis railroad; 630 sq. m.; pop. '90, 26,787. It has a level surface of prairie and timber land, and fertile soil. The chief productions are corn, wheat, oats, butter, and wool. Co. seat, Paris.

EDGARTOWN, town, port of entry, and co. seat of Dukes co., Mass., 75 m. s.s.e. of Boston. The port is on the e. side of the island of Martha's Vineyard, thirty miles from New Bedford, and has a well sheltered harbor. It is a summer resort and headquarters for whale-fishing. Near Edgartown is a grove which was long famous for Methodist camp-meetings. The town is intersected by the Martha's Vineyard rail-

road, and has a custom house, court house, high school, public library, churches, bank, and weekly newspaper. Pop. '90, 1156.

EDGECOMBE, a co. in n.e. North Carolina, on Tar river, intersected by the Atlantic Coast Line railroad; 520 sq. m.; pop. '90, 24,113, includ. colored. The surface is generally level, and the soil light and sandy. The chief productions are corn, cotton, and turpentine. Co. seat, Tarboro.

EDGECUMBE.—1. A bay in the e. coast of Australia, lies within the province of Queensland, near lat. 20° s., and long. 148° east. It is sheltered on every side but the north, its east barrier terminating in cape Gloucester.—2. A mountain in what was formerly Russian America, marks the n.w. point at the mouth of Norfolk sound, which connects the settlement of New Archangel on the island of Sitka with the open ocean. It rises from the water's edge as an almost perfect cone, which, during nearly the whole year, is capped with snow. It has been an active volcano within the recollection of some of the Russian colonists; and, even at the present day, the neighborhood presents indications of subterranean energy, such as tremblings of the earth, hot springs, and eruptions of smoke and ashes.

EDGEHILL, BATTLE OF. The first great battle of the civil war was fought on Sunday, 23d Oct., 1642, between the royalist forces under Charles and the parliamentarians under the earl of Essex. It was the intention of Charles, who had been lying at Shrewsbury, to march upon London by Wolverhampton, Birmingham, and Kenilworth; and Essex, who had thrown himself into Worcester, on being informed of the king's plans, marched forward to intercept him, and entered the village of Keinton, in Warwickshire, on the evening of the 22d. On the following morning, the royalist army was discovered a little in advance, and drawn up in order of battle on the elevation of Edgehill. The king's forces had the advantage in numbers and in cavalry, as well as in position; Essex, however, had the more formidable train of artillery. Charles had commanded that hostilities should be delayed until the enemy should open fire; accordingly no movement took place till about two o'clock, when Essex commenced the fight by firing upon the royalists, who immediately replied with their cannon. The royalists then began to descend the hill, and prince Rupert, who led the right wing, charged with his cavalry the left wing of the parliamentarians, broke it, and pursued it madly to Keinton, where his men, regardless of the main army, busied themselves in plunder. This was the fatal movement of the day. The right wing of the parliamentarians had charged and recharged with the greatest success, until, after some stubborn fighting around the royal standard, the royalists broke, and retreated toward the hill. That night 4,000 men lay slain at the foot of Edgehill, and of these the greater number were royalists.

EDGEFIELD, a co. in w. South Carolina, on the Savannah river, by which it is separated from Georgia; 1352 sq.m.; pop. '90, 49,259. The surface is hilly, and the soil moderately fertile. Co. seat, Edgefield.

EDGEWATER, a village in Richmond co., N. Y.; on Staten Island and New York bay, and the Staten Island Rapid Transit railroad. It is an attractive suburb, with churches, a bank, electric lights and railroads, U. S. marine hospital, Staten Island hospital, public park, brewery, and looking-glass factory. It is the home of many New York business men. Pop. '90, 14,265.

EDGEWORTH, MARIA, the daughter of Richard Lovell Edgeworth, of Edgeworthstown, co. of Longford, Ireland, was born at Hare Hatch, near Reading, Berkshire, in the year 1767. In 1782, her father returned to Ireland, accompanied by his family, to whose education he earnestly devoted himself. Maria's talents quickly developed themselves. Her first literary effort was written in conjunction with her father, and was entitled *Essays on Practical Education* (1798). In 1801 appeared the *Essay on Irish Bulls*, which was also in part the work of Mr. Edgeworth. But it was in the sphere of fiction that Miss E. won her greatest triumphs. In 1801, she published *Castle Rackrent*, the first of a pretty extensive series of novels characterized in general by a quiet, agreeable humor, excellent sense, and lively delineation of character and manners. It has been objected by critics, however, that some of them are too manifestly didactic to please as fiction should please. In 1803 appeared *Belinda*; in 1804, *Popular Tales*; in 1806, *Leonora*; in 1809, *Tales of Fashionable Life*; and in 1812, a second series of the same. The last of the series was "Helen," which was published in 1834. Among the most successful of her *Tales of Fashionable Life* were "Ennui" and "The Absentee." Miss E.'s stories for children—the last of which, *Orlandino*, appeared in *Chambers's Library for Young People*—are deserving of high praise. This gifted and universally respected authoress died at Edgeworthstown, 21st May, 1849.

EDGEWORTH, RICHARD LOVELL, 1744–1817; b. Bath, England; the father of the celebrated authoress, Maria Edgeworth, and associated with her in literary labors. He was an intimate friend of Dr. Erasmus Darwin. Among his writings are *Professional Education*; *Practical Education*; *Essay on Irish Bulls*; and autobiographical memoirs.

EDHEM PASHA, Turkish statesman, b. of Greek parents on the island of Scio, in 1823. When a child he was sold as a slave to Khosseo Pasha, who subsequently gave

him his liberty and had him educated at Paris. He was appointed to the general staff of the Turkish army; became adjutant to the sultan in 1849 and general of division; was minister of the interior in 1856-7; minister of foreign affairs in 1867-77; ambassador to Germany; grand vizier in 1877-79; ambassador to Austria; minister of the interior in 1883-85; became ambassador to France in 1885; and commanded the Turkish forces operating against the Greeks in 1897.

EDIBLE BIRDS' NESTS, or **EDIBLE SWALLOWS NESTS**. See **NESTS**, **EDIBLE**.

EDICT (Lat. *edictum*). The power of making edicts (*jus edicendi*) belonged generally to the higher magistrates at Rome; but it was by the curule ædiles, and more extensively still by two prætors—the *prætor urbanus*, and the *prætor peregrinus*—that it was prominently exercised. In a province, the jurisdiction of the prætor passed to the *præses*. As this power was co-extensive with the possession of what were called the honors (*honores*), it was frequently spoken of as the *jus honorarium*; and from its being exercised chiefly by the prætors, it was also known as the *jus prætorium*. The edicts of the prætors are mentioned by Gaius among the sources of the Roman law; but, strictly speaking, they are to be considered as rules promulgated by the magistrates on entering on office, rather than as expressions of the will of the Roman people, either direct or indirect. The E. of one prætor was not binding on his successor, but very often edicts were adopted and confirmed, and this came gradually to constitute a very important body of law. They were frequently known by the names of their first promulgators, though they were often named with reference to the formula and the *actio* which they established. The power of promulgating edicts is supposed to have flowed down from the kings to the consuls, and through them to the prætors, and thus to have formed part of what we should call the royal prerogative. Even in Cicero's time, the study of the E. had become a regular branch of the study of the law. In 67 B.C., the Lex Cornelia provided against the abuse of passing edicts for the decision of particular cases by requiring the prætors to decide in conformity with the edicts which they promulgated with reference to their whole tenure of office, which were known as perpetual edicts. Servius Sulpicius, the friend of Cicero, addressed to Brutus a work on the subject; and Ofilius made what was probably a compilation of the various edicts, resembling the subsequent one by Julian. The object of the E., according to the Roman jurists, was to aid, supplement, and correct the civil law, and to render it more conducive to the public service, and they speak of it as "the living voice of the civil law." It was, in short, an indirect form of legislation, which public opinion had sanctioned for the public convenience; and there can be no doubt that it contributed what was ultimately the most valuable part of the Roman law. There were many commentators on the edicts under the emperors, amongst whom Labeo is mentioned and cited by Ulpian (*Dig.* 4, tit. 3, s. 9). Julian is supposed to have collected and arranged the edicts, and given to them a systematic form. Gaius, Ulpian, and Paulus composed treatises on the edicts of the curule ædiles; and it is chiefly from the writings of these and the other jurists excerpted in the *Digest*, that we know anything of the character of the E., the portions of it which have been preserved being mere fragments. They have been collected by Wieling in his *Fragmenta Edicti Perpetui* (Frank. 1733).

EDICT OF NANTES. See **NANTES**.

EDICTAL CITATION, or **INTIMATION**. By the former practice of Scotland, where the party to be cited before a civil court was out of Scotland, the citation required to be given by a messenger-at-arms making proclamation at the market-cross of Edinburgh, and at the pier and shore of Leith. The idea, of course, was, that the fact was thus more likely to reach the absent party than if it had been intimated or published in any other manner.—Erskine, b. i. tit. 2, s. 18. But the practice in this matter was altered by the so-called judicature act (6 Geo. IV. c. 120), and the subsequent statute, 13 and 14 Vict. c. 36, s. 22, which enacted that services against persons forth of Scotland should be done by delivery of copies at the record office of the keeper of the records of the court of session. Abstracts of the copies delivered to the keeper are ordered to be recorded by him, and to be printed periodically at the end of each successive 14 days, and the record is to be at all times open for inspection. In criminal cases, the old forms still remain unaltered.

EDINBURGH, the capital of Scotland, and chief town in the co. of Mid-Lothian, occupies a picturesque situation on a cluster of eminences, at a distance of about a mile and a half from the firth of Forth (q.v.), which is here about 6 m. in breadth. The outskirts extend almost to the shore, and a connection has thus been formed on the n. with Leith, the ancient port; Newhaven, a fishing village; and Granton, a modern and rising port. The admirable position of E. has induced the comparison with Athens, from which, as well as its literary fame, it takes the title "Modern Athens." The Gaelic name of the city is "Dunedin."

The castle, which crowns the highest point in the city, was undoubtedly built first, a town gradually forming on the top and sides of the ridge, which slopes downwards to the east. For some centuries the city was confined entirely to this ridge or hill, and was flanked on the n. by a lake or marsh called the Nor' Loch. The remaining means of defense was a wall built by the citizens about the middle of the 15th c., a few relics of which, of different eras, still exist. E. was therefore a fortified town, protected by

the castle at its western extremity. When David I. was induced by his piety and munificence to found the abbey of Holyrood in the low ground eastward of the city, he at the same time empowered the canons of this religious house to found a burgh in a westerly direction towards the city of E., and thus was built the Canongate, afterwards united to the city. The beautiful abbey itself has been a ruin since the fall of its roof in 1768. In connection with the abbey sprung up the palace, which became a favorite abode of the Scottish sovereigns. Not, however, till about the era of the murder of James I. at Perth in 1437, did E. become the recognized capital of the kingdom. Neither Perth nor Seone, Stirling nor Dunfermline, being able to offer to royalty security against the designs of the nobles, E. with its castle was thenceforth selected as the only place of safety for the royal household, the parliament, the mint, and the various important government offices. By this means rising in importance, E. became densely peopled, and the houses were built to an unusual height, that the inhabitants might keep within the walls for the sake of protection. The town then consisted of the original main way called the High street, reaching to the Canongate, and a parallel way, narrow and confined, on the s., called the Cowgate, connected with each other by upwards of 100 narrow cross alleys or closes, between dense clusters of houses. Most of these houses consisted of a succession of floors or flats, each being a separate dwelling, and of such floors there were seldom fewer than 6, and sometimes 10 or 12, towering to an immense height, and rendered still more imposing from being built on an eminence.

The citizens remained content with these confined limits till about the middle of the 18th century. Between 1763 and 1769, the North bridge was erected, connecting the old city with the fields on the n., on which the *New Town* was beginning to be built. Shortly afterwards, in 1788, the line of this bridge was extended southwards by 22 arches (the South bridge), only one of which is seen where the structure spans the Cowgate, and thus a level way was opened to the southern suburbs, which have since rivaled the new town in rapid growth. George the Fourth's bridge was erected over the same valley a short distance to the westward, a considerable time afterwards. The Nor' Loch was drained and partially bridged over by the Mound formed from the earth dug from the foundations of the new town, and its situation is occupied by fine public and private gardens which now lie in the center of modern E., and separate Princes street, the south-most and most picturesque street of the new town, from the old town. Two other bridges give access to E.—the Regent's bridge, Waterloo place, which arches the valley between Princes street and the Calton hill to the e.; and at the w. end, the fine Dean bridge over the water of Leith, which is 106 ft. high. On May 25, 1896, the foundation of a new North bridge was laid. According to the plan, the length is 525 feet and the bridge consists of three spans. The new town being built with much regularity in straight streets, and in squares and crescents with numerous gardens, contrasts with the crowded though picturesque masses of the old town. The dilapidated and dangerous state of part of the old town, and the necessities of sanitary ameliorations in the overcrowded buildings, have occasioned great changes of recent years, and several new streets have been opened up through the most crowded and ruinous localities.

Altogether built of durable sandstone from quarries in the neighborhood, the general aspect of the houses is that of great solidity. Among the most interesting features of the town are the castle, in which are shown the ancient regalia of Scotland; the parliament house, used by the Scottish parliament before the union; St. Giles' cathedral, with a magnificent crown on the central tower; the abbey and palace of Holyrood (q. v.); the bank of Scotland; the Scott monument, designed by a native self-taught artist; Heriot's (q. v.) and Donaldson's (q. v.) hospitals; the general register-house, where all heritable titles and state documents are recorded and preserved; the post-office; the royal institution, where the royal society, and the society of antiquaries of Scotland meet; national gallery; the assembly hall of the church of Scotland; an Anglican cathedral; the university and museum of science and art; the Episcopal churches (St. John's and St. Paul's); and the banks, clubs, insurance offices, and hotels of Princes street and George street. The monument on the Calton hill is striking from its position. The country round E. is finely varied. From Arthur's seat and Salisbury crags, on the s.e., the eye wanders to the Braid hills on the s., and the richly wooded Corstorphine hill on the w., all within a mile or two of the town; while further off begin the Pentland hills, 4 m. to the s.e.; and to the n. the firth of Forth, and the Fife coast and hills, form a magnificent background. The climate is bracing and healthy, although the situation is exposed, not so much rain falling as on the w. coast, and high winds are very prevalent.

E. is not an important manufacturing town, though it derives considerable commercial importance from its various banks and insurance offices, round which revolves no mean portion of the monetary capital of Scotland. The principal industries are brewing (two thirds of all the ale or beer brewed in Scotland being made in or near E.), printing and publishing with the kindred arts (see BOOK-TRADE), distilling, ironfounding, tanning, and coachbuilding, manufacture of articles in India-rubber, of house-furniture, and of jewelry, and the rearing of young trees in nurseries in and around the town, for which the climate is favorable.

E. is the place of residence of considerable numbers of the Scottish landed gentry, and its society is regarded as unusually polished from the predominance of the professional

and literary elements in its composition. This arises partly from its being a university town, and partly from the presence of the supreme law courts of Scotland, all the important legal business being attracted thither on that account; the Edinburgh lawyers have charge of most of the landed estates throughout the northern part of the kingdom, so that there is an unusual number of advocates (barristers), writers to the signet, and solicitors (attorneys and conveyancers), and accountants. Its medical practitioners—surgeons and physicians—have a high reputation. E. is much resorted to for the sake of education, for its university (q.v.) and medical schools, its high school, and its various other educational institutes. The Free church and the United Presbyterian church have each a well-equipped divinity hall in E. The opening in 1869 of the merchant company's schools, which (by utilizing certain surplus hospital funds) provide high-class instruction at moderate charges, has added to the influx of residents desirous of availing themselves of this boon. For the poorer classes, part of the enormous funds of George Heriot's charity have been diverted for cheaper schools throughout the town. Fettes college is a foundation school on the model of Rugby and Eton, and is a handsome edifice.

E. is largely resorted to by visitors to the Highlands of Scotland, and has an unusual number of hotels. There are two theaters, and abundance of amusement, including a large open-air gymnasium. In the southern environs are fine open links or downs, where the game of golf (q. v.) has been played from time immemorial. Excellent street cabs are to be found, and tramways are laid to the suburbs.

E. is the seat of various Scottish boards (poor-law supervision, lunacy, fisheries, school, northern light-houses, etc.); in it the Established and Free churches hold their annual assemblies and courts, as do the United Presbyterians.

E. is a royal burgh, governed by a town council composed of 41 members. The town council elects from its own body a lord provost and six bailies, who constitute the civic magistracy. E. is represented by four members in parliament.

In 1821 the pop. was 112,235; in 1861 it was 167,851; and in 1871, 196,979. Number of inhabited houses, 10,529; parliamentary and municipal constituency (1878-79), 28,342. Pop. 1891, 264,796; 1896, 276,514.

EDINBURGH, ALFRED ERNEST ALBERT, Duke of, third child and second son of queen Victoria; b. Aug. 6, 1844. He is also a duke of Saxony, and in 1893 became reigning duke of Saxe-Coburg-Gotha. He was educated by special tutors, and at the age of 14 went into the royal navy, serving chiefly in foreign stations. The crown of Greece was offered to him in 1862, but he declined it. In 1866 he took his place in the house of lords; in 1867 he commanded the frigate *Galatea* on a voyage to Australia and India. He attended a picnic in New South Wales, where an Irishman fired at and slightly wounded him. The duke married at St. Petersburg, Jan. 21, 1874, Marie Alexandrowna, grand-duchess of Russia. They have five children, a son and four daughters.

EDINBURGH, THE UNIVERSITY OF, took its rise from a bequest in 1558 by Robert Reid, bishop of Orkney, of 8,000 merks; but the sum was retained for a considerable time by the abbot of Kinloss. The magistrates of the city, on the faith of receiving the bequest, purchased in 1563 a portion of the ground on which the present university stands. Queen Mary was anxious that the proposed institution should succeed, and bestowed upon it grants of confiscated church property. The university was formally founded by king James VI. in 1582 by royal charter, in virtue of which the corporation, up till 1858, remained its patrons or governors. In 1583, the work of instruction began under Robert Rollock, the first regent. Originally, the university consisted of but one class and one regent or teacher. The regent had charge of the students from their enrollment to their laureation at the close of the fourth session of study. As the university prospered, additions were made to the staff of regents, and separate chairs for the several branches were founded. In the beginning of the 17th c., the *senatus academicus* consisted of a principal and four regents. The first theological chair was instituted in 1642, and the first professor of medicine was appointed in 1685. After 1688, the university of E., along with its sister universities, was subjected to a parliamentary visitation. The commission was issued in 1690, and till the close of the century the university was under its control. Under this supervision, a separate chair of Greek was established; and after 1708, the present arrangement of the faculty of arts came into existence. About this period, the faculty of law was created. During the 18th c., the professoriate rapidly increased; and in 1760, the *senatus academicus* contained 18 professors and a principal. Twenty-three chairs have since been added. In 1858, an act of parliament was passed, by which the constitution of the university was materially changed. The government was taken out of the hands of the lord provost, magistrates, and town-council of the city, and placed in the *senatus academicus* and a university court; and the patronage of the chairs—from 1582 in possession of the corporation—was transferred to seven curators, three of whom are nominated by the university court, and four by the town-council. A general council was also established, consisting of graduates of the university, and all persons who, up till Aug., 1861, could satisfy the university commissioners that they had given attendance on four complete sessions of the university. This general council now consists solely of the grad-

uates of the Univ.; and members of this body, together with the professors and university court, have the right of voting in the election of a member of parliament for the universities of Edinburgh and St. Andrews.

Matriculation, Faculties, Degrees.—Students entering any class in the university, are required to inscribe their names in the general matriculation album of the university, which is the legal record of attendance; and the matriculation ticket serves as a passport to the privileges of the university library. The university consists of the faculties of arts, medicine, theology, and law. The faculty of arts comprises the chairs of humanity, Greek, mathematics, logic and metaphysics, moral philosophy, natural philosophy, rhetoric and belles lettres, universal history, practical astronomy, agriculture, music, Sanscrit, engineering, geology, political economy, fine arts, and education. Attendance on the first seven of these is incumbent on every one proceeding to the degree of M.A. The medical faculty comprises the chairs of institutes of medicine, materia medica, medical jurisprudence, chemistry, surgery, practice of physic, anatomy, pathology, midwifery, clinical medicine, clinical surgery, botany, natural history. The faculty of theology comprises the chairs of divinity, ecclesiastical history, Biblical criticism and antiquities, Hebrew. The faculty of law comprises the chairs of civil law, public law, law of Scotland, conveyancing. The degrees granted by the university are master of arts, bachelor of medicine, master of surgery, doctor of medicine, bachelor of science, doctor of science, bachelor of divinity, doctor of divinity, bachelor of laws, doctor of laws. A chair of Celtic was added, 1882, to the faculty of arts.

Libraries, Museum, Societies.—The university library originated in a bequest, in 1580, by Mr. Clement Little. The bequest amounted to about 300 volumes. It enjoyed the right of receiving every book entered in Stationers' hall, but a composition of £575 per annum in lieu of the privilege was subsequently accepted. The university library contains about 150,000 printed volumes, and 2000 volumes of MSS. The university also contains subsidiary libraries, such as the theological library, the humanity class library, etc. The natural history museum was established in 1842, and received a government grant of £200 per annum. It was in 1854 transferred to the new museum of science and art, where it forms a natural history department, of which the professor of natural history is the regius keeper. The anatomical museum was founded by the town-council and the senatus academicus in 1826. The botanical museum is stationed in the botanic garden, which is in connection with the university, and several valuable museums exist as appendages to classes. There are several societies in connection with the university, which meet in its buildings during the winter session.

Bursaries.—There are considerably upwards of 100 bursaries and prizes connected with the university of E., and the total yearly amount of these may be estimated at more than £15,000. These bursaries are appropriated to the different faculties, and are in the patronage of the senatus, the town-council, and of private individuals. Their yearly values range from £5 to £90, and they are generally held for a period of four years.

Scholarships and Fellowships.—There are numerous scholarships, ranging in value from £30 to £120, and fellowships, from £100 to £160 per annum.

Students.—The number of students has of late been steadily increasing, and in '95 was 2836. Women have been admitted to graduation in Arts and Sciences since 1892. The existing buildings (erected 1789-1816) proving insufficient, stately new buildings have since then been erected. See Principal Sir A. Grant's *Story of the University of E.* (1883).

EDINBURGH REVIEW, the first of the great critical periodicals which form a distinguishing feature of the literature of the 19th century. It was started in Oct., 1802, by a knot of young men living in the northern metropolis, the principal of whom were Francis Jeffrey (q.v.), Sidney Smith (q.v.), F. Horner, and Henry Brougham (q.v.). So much was secrecy felt or believed to be necessary to the success of the undertaking, that, according to the account which lord Jeffrey gave to Mr. Robert Chambers in 1846, "the dark divans" of the reviewers were held for some time "in a dingy room of Willison's printing-office in Craig's Close," to which each repaired alone, and "by back approaches or different lanes." Of the first number, 750 copies were printed: the demand exceeded this limited supply; 750 more were thrown off, and successive editions followed. In 1808, the circulation had risen to about 9,000, and it is believed to have reached its maximum—from which it has declined—in 1813, when 12,000 or 13,000 copies were printed. The pay of contributors was at first ten guineas a sheet, but shortly after "the *minimum*," says Jeffrey, "was raised to sixteen guineas, at which it remained during my reign. Two thirds of the articles were, however, paid much higher, averaging, I should think, from twenty to twenty-five guineas a sheet on the whole number." The original publisher was the well-known Constable. The political views advocated in the early pages of the *Edinburgh Review* were *whig*, and to these it has consistently adhered to the present day. Its influence in developing and strengthening the political convictions of the whig party cannot be overestimated; but its power was even more visible, certainly more immediately palpable, in literature. Amid the feeble and effete periodicals of the day, it burst like a bombshell. The keenness of criticism,

the sharpness of wit, the brilliancy of style, the vigor of mind and comprehensiveness of knowledge exhibited by the writers, excited amazement and fear in the world of letters; and although, in the case of Wordsworth, Southey, and other writers of a certain school, unfairness of a flagrant kind was undoubtedly exhibited and persevered in, yet impartial justice was, on the whole, administered, and the rising generation of authors strained their utmost to escape the lash. Since the period of Jeffrey, the most brilliant contributor to the *Edinburgh Review* was Macaulay. See Napier's *Correspondence* (1879).

EDINBURGHSHIRE, or MID-LO'THIAN, the metropolitan co. of Scotland, lying on the s. side of the firth of Forth. Its greatest length from e. to w. is 36 m., and its breadth 18 m., with an area of 362 sq. miles. From the s. border, the Pentland hills (mean height 1000 ft., and highest point 1898 ft.) and the Moorfoot hills (mean height 800 ft., and highest point 2,136 ft.) run n.e. through the county. In the n. are fertile plains, varied by gentle slopes, ridges, and hills of trap. The coast, 13 m. long, is partly sandy, and is studded with towns, villages, and piers. The chief rivers are not above 20 m. long, and are the Esk, Water of Leith, Almond, and Gala Water. Four great roads and five great railways traverse the county. E. chiefly consists of carboniferous strata, with protrusions of trap. Some lower Silurian rocks occur in the s.e. Coal and iron are chiefly worked in the broad valley of the Esk. Here the bed of coal extends 15 by 8 m., and contains 33 seams $\frac{1}{2}$ of a foot to 6 ft. thick. Near the western boundary of the county are valuable oil shales. The fine sandstone quarries of Craigleith contain large fossil trees, and the limestone of Burdiehouse is famed for fossil fishes. Cold and dry e. winds prevail in spring. Clay soil predominates. The county is chiefly agricultural, with large farms. The harvest is a week earlier on the coast than at the height of 200 ft., and a fortnight earlier than at the height of 600 feet. Near the metropolis are extensive nurseries, vegetable and fruit gardens, and dairy pastures. Pop. '91, 434,276. Although not important as a manufacturing county, there are considerable manufactures of various goods in Edinburgh, Leith, and Musselburgh; and there are large paper-mills along the course of the North Esk. Much paraffin oil is made from the rich bituminous shale found within the county. E. returns one member to parliament for the county. The chief towns are Edinburgh, the metropolis of Scotland; Leith, its seaport; Dalkeith, Musselburgh, and Portobello. In E. have been found cairns, stone circles, Roman coins and utensils, and traces of Roman camps and burying-places. E. was included in the Roman province Valentia, and Cramond is supposed to have been a chief Roman port. It afterwards formed part of the kingdom of Northumbria, 446-1020. The county contains many feudal and ecclesiastical remains, as Borthwick castle, Cragmillar castle, and Roslin chapel.

EDISON, THOMAS ALVA, b. Ohio, 1847, of a mother of Scotch and a father of Dutch descent. The boy had scarcely eight weeks of common school education, but he had a passion for reading, and his education was greatly advanced by the assiduous care of his mother, who, however, died when he was but 15 years old. Before he was 12 he had read Hume and Gibbon, and all that he could get of the *Penny Cyclopædia*. He had a liking for chemistry, and such a thirst for all kinds of knowledge, that he firmly resolved to read every important book in the Detroit public library. With this design he went through Newton's *Principia*, Ure's *Dictionary of Science*, and by way of dessert, Burton's *Anatomy of Melancholy*. Becoming a newsboy on the trains of the Grand Trunk railroad, his employment introduced him to a more varied range of books. The infection of chemistry clung to him, and was developed by his establishing a laboratory in an empty car. But his chemicals exploded, set the car on fire, and put the train in great danger. The boy and his broken apparatus were promptly thrown out of the car by the indignant conductor. The next venture of the young enthusiast was in getting a small lot of type, and issuing on the train a small sheet called *The Grand Trunk Herald*. Becoming acquainted with telegraph operators, he determined to learn the art himself. A kind-hearted station-master consented to give him lessons, and for several months Edison returned to that station after a long day's work, and took his regular lessons at night. He became an expert operator, and was employed at Port Huron, Mich., Stratford, Canada, and Adrian, Mich., where he also prepared a small workshop and began to repair telegraph instruments and manufacture other novel machinery. From this place he went to Indianapolis, where he invented his automatic repeater, an instrument by which messages are transferred from one wire to another without the aid of an operator. He wandered to Cincinnati, Louisville, Memphis, and New Orleans, returned to Cincinnati, and at the age of 20 began to be known as a successful inventor. But he was called to Boston on telegraph business, having become famous as one of the most expert of operators, and there he set up a shop for his experiments. Testing, in 1870, between Rochester, N. Y., and Boston, his new invention of duplex telegraphing, he was not successful; but he was employed by the gold indicator company in New York, of which he became superintendent. While in this position he brought out some new inventions, and introduced improved apparatus. At the same time he set up a factory in Newark, N. J., for making his novel apparatus and machines. Here he employed 300 persons; but the superintendence took so much of his time that he gave it up, and, in 1876, set up a small experimenting establishment at Menlo Park, on the Pennsylvania Railroad, 24 m. from New York. This establishment soon grew to be

almost a village in itself. His main laboratory, at Orange, N. J., is the Mecca of all men interested in the perfection of artificial lighting by electricity. His inventions are all practically useful, and are unlimited in their range; from the motor for sewing machines to the microtasmeter, which measures infinitesimal variations of temperature, and by means of which the heat of the sun's corona, as well as that of the stars, has been investigated. The number of inventions great and small, already patented by Edison, is said to be over 700. The most important are the carbon telephone, the phonograph, the electric fire-alarm, the *ædiphone*, the megaphone, the phonometer, the electric pen, the quadruplex system of telegraphing, by means of which four messages at the same time may be sent in opposite directions over a single wire, and perfectly delivered, the kinetoscope, the vitascope, and the fluoroscope, with which he was able to see the bones of the hand and other hidden objects. (See *ELECTRIC LIGHT*.) In 1878 he was made a chevalier of the Legion of Honor by the French government, and in 1889 a grand commander, in recognition of his great services and of his remarkable exhibit at the Paris exposition.

EDISTO, a river of South Carolina, flows through the s.w. part of the state, being formed near Branchville of the North Edisto and the South Edisto, and entering the Atlantic by two arms respectively named from the two confluents. E. also designates the island which separates those two arms. The stream is navigable for 100 m. upwards, and its mouth is about 20 m. to the s.w. of Charleston.

EDISTO ISLAND, one of the "sea islands" so famous for long-staple cotton, on the South Carolina coast, between North and South Edisto inlets.

EDITIO PRINCEPS, the first edition of a book. The term is especially used with reference to the first printed edition of a Greek or Latin author.

EDITION DE LUXE, the finest edition of a work, in which everything is of the most excellent quality. The best paper is used; the type is very clear and distinct; and all the embellishments are of the highest order. In general only a limited number of copies of an edition de luxe are offered for sale; and these are generally sold by subscription.

EDMONDS, JOHN WORTH, b. N. Y.; 1799-1874; a graduate of Union college, admitted to the bar in 1819, and practiced law in his native city (Hudson). In 1831, he was a member of the state assembly, and of the senate (then the court of errors) from 1832 to 1835. In 1837, he removed to New York city; in 1845, he was appointed one of the circuit judges; in 1847, judge of the supreme court, and in 1852, one of the judges of appeals. About 1851, he became convinced of the truth of spiritual manifestations, and in 1853 publicly declared his faith—preparing and publishing a work entitled *Spiritualism*. He became a leading champion of the doctrines, and his well-known ability as a jurist was of great advantage to the unpopular innovation.

EDMONSON, a co. in central Kentucky, watered by Green river, crossed by the Louisville and Nashville railroad; 348 sq.m.; pop. '90, 8005, incl. colored. The surface is uneven; soil tolerably fertile; coal is abundant. The chief productions are corn and tobacco. The county contains the famous Mammoth cave. Co. seat, Brownsville.

EDMONTON, a large village in the n.e. of Middlesex, near the Kerr, 7 m. n.e. of London. Pop. of parish '90, 25,380. It contains many villas of London merchants, etc. Charles Lamb is buried in the churchyard here. E. is connected with Cowper's humorous poem of *John Gilpin*.

EDMONTON, a town in the district of Alberta, Northwest Territories, Canada; on the Saskatchewan river and the Calgary and Edmonton railroad. Gold, silver, wood, and coal are found in the vicinity, and coal mining is the principal industry. It has several churches, electric lights, branch bank, and newspapers. Pop. '91, 2000.

EDMUND I., or **EADMUND I.** (*ÆTHELING*), 922-46; son of Edward the Elder, grandson of Alfred the Great, and king of the Mercians and West Saxons, succeeded Athelstan (his brother) in 941, at the age of 18. He had shown remarkable bravery three years before in the battle with the Danes at Brunanburg. At the time of his succession the Northumbrians brought over from Ireland Anlaf, a Danish king of Dublin; the Danes joined them, and Edmund was compelled to make a large cession of territory. After the death of Anlaf, Edmund freed his own kingdom, subdued the Britons of Cumberland, and gave their territory to Malcolm of Scotland to secure his co-operation in military service. Edmund was assassinated by an outlaw May 26, 946, while at a banquet.

EDMUND, SAINT (**EDMUND RICH**), 1170-1240; b. Abingdon, England; the son of a mother whose piety amounted to ascetic fanaticism, and from whom he learned to become a self-tormentor. He got a tolerable education at Oxford, where he became a teacher in the university. His tendency of mind was to theology, so he became a priest, and was the first Englishman to receive the title of doctor of divinity. In 1227, he was one of the preachers of the sixth crusade. In 1234, he was consecrated archbishop of Canterbury. In 1236, he married king Henry III. to Eleanor, daughter of the count of Provence; but he was soon at enmity with the king, who induced the pope to send to

England a legate who should have authority above that of Edmund. The latter was now in disfavor with both king and pope, and made a journey to Rome to effect a reconciliation; but he was insulted by the pope, and returned to England broken in spirit and resources. In 1240, he went to Pontigny, France, where the queen of France and her sons came to receive his blessing. To find improvement in health, he went to Soissy, where he died. His tomb became immediately famous for miracles, and six years after his death, the man who had always protested against the robbery of the people by the church was proclaimed a saint by the act of canonization.

EDMUND IRONSIDE, king of the Anglo-Saxons, son of Ethelred II., and half-brother of Edward the Confessor, was b. in 989. He calls for notice chiefly as the great opponent of Canute and the Danish party. On the death of Ethelred, the Danes proclaimed Canute king of England; but the citizens of London declared for E., who drew together his forces, and engaged Canute, first at Pen, in Dorsetshire (or, as other accounts say, at Gillingham, in Somersetshire), then at Sceaorstan, and again at Ottenford, or Otford, in Kent, in all of which battles he was victorious; but a severe defeat which he sustained at Assandun, in Essex, compelled him to compromise with his adversaries. An arrangement was entered into by which England was divided between the two kings, Canute obtaining possession of Mercia and Northumbria, the rest falling to the share of Edmund. It was also agreed that on the death of either, the survivor was to succeed him. E. having died a few weeks after this agreement had been drawn up, Canute became king of all England, Nov. 30, 1016. E. received the surname of *Ironsides*, either from his great strength or from his armor.

EDMUNDS, a co. in northern S. Dakota, formed in 1873; intersected by several railroads; surface somewhat broken; pop. '90, 1155. Co. seat, Ipswich.

EDMUNDS, GEORGE FRANKLIN, born Vt., 1828. Besides a common school education he had the advantage of a private tutor; studied law at an early age, and was admitted to the bar in 1849. He settled in Burlington in 1851; and in 1854, and successively for four years, he was chosen to the popular branch of the state legislature, for three of the five years being speaker of the house. In 1861-62, he served in the senate, where he was speaker *pro tem*. When the civil war broke out he was a member of the state convention which met to form a coalition between the republicans and the war democrats, and he drew up the resolutions adopted by that convention as the basis of union. At the death of Solomon Foot, Edmunds was appointed to fill the vacancy from Vermont in the U. S. senate, and taking his seat in April, 1866, held office till his resignation, 1891. In the federal senate he has served on the committees on commerce, public lands, pensions, retrenchment, the judiciary, etc. He was a delegate to the Philadelphia "loyalists'" convention in 1866; was for several years at the head of the judiciary committee of the U. S. senate; and was author of the anti-polygamy acts of 1882 and 1887. His name was mentioned several times for the republican presidential nomination.

EDMUND'S (Str.) HALL, Oxford, derives its name from St. Edmund, archbishop of Canterbury in the reign of Henry III. As early as 1269, it appears to have been purchased by the canons of Osney, and devoted to purposes of education. On the dissolution of religious houses under Henry VIII., it fell into the hands of two citizens of Oxford, who sold it to William Denyse, provost of Queen's college. The provost devised it to his college, and that society accordingly now nominates the principal of St. Edmund's Hall. There are ten exhibitions attached to the hall, value £30 per annum, appropriated to students designed for holy orders, and in the gift of the principal. In 1890, there were 43 undergraduates.

EDOM (New Testament, IDUMÆA), a word signifying "red." It was, according to Gen. xxv. 29-34, the name given to Esau on account of the *red* pottage supplied to him by his brother Jacob. Hence, the country which Esau afterwards obtained was called the land of Edom, but previously Mount Seir. The ruddy hue of the mountain-range, however, may have had something to do with the naming of the region. E. comprised a strip of country 100 m. long by 20 broad, lying between the s. of Palestine and the gulf of Akabah (an arm of the Red sea). It is a wild, mountainous region, with the desert on the e. and w. of it; but rugged though it looks, it contains rich glens and terraces, where flowers, and shrubs, and trees spring up luxuriantly. Its capital was Bozrah (now Buseirah), in the extreme north; its seaports were Elath and Eziongaber, in the extreme south, at the head of the gulf of Akabah. During the reigns of David and Solomon, E. appears to have been under subjection to the Israelites; but when the kingdom of Israel began to decline, the Edomites repeatedly ravaged the southern borders of Palestine, which circumstance is perhaps the reason why they are so terribly denounced by some of the prophets. At a later period, the term Edom (now giving way to the Greek form Idumæa) designated the region between the gulf of Akabah and the Mediterranean, including a part of the s. of Palestine. The revival of Jewish power under the Maccabean princes once more brought Idumæa under Jewish sway. The people were compelled to conform to the laws and customs of their conquerors, and the country was for the future ruled by Jewish prefects, one of whom, called Antipater, who was born in the country, acquired the friendship of the Roman emperor, and was appointed procurator of all Judea. His son was the famous Herod

the Great, "king of the Jews. In the 7th c. A.D., E. was overrun by the Arabs, and has ever since shared the fortunes of Arabia.

EDRED, d. 955; king of the Anglo-Saxons, son of Edward the Elder, and successor to Edmund I. He was victorious over the invading Danes in Northumbria. His nephew Edwy was his successor.

EDRIOPHTHALMATA (Gr., sessile-eyed), a section of the class of crustaceans, consisting of those *malacostracous* crustaceans which have the eyes sessile—not mounted upon stalks. They also differ from the other malacostraca in having the organs of respiration connected with the organs of locomotion; some of them, which constitute the two orders *amphipoda* and *læmodipoda*, having the respiratory organs connected only with the true or thoracic legs, whilst in the remaining order, *isopoda*, they are connected only with the abdominal or false legs. The E. are generally marine; many of the *amphipoda*, however, are inhabitants of fresh water; some of the *isopoda*—as the armadillo-louse and wood-louse—are terrestrial, but are inhabitants of damp places. Many both of the marine and fresh-water species spend their lives rather among the weeds and decaying matters of the shore than in the water, to consume these being apparently their office in the system of nature; some have organs adapted for leaping and for burrowing in the sand, as the common sandhopper (*talitrus locusta*), one of the *amphipoda*, of which countless myriads are to be seen on all our sandy shores, attracting the admiration of even the most careless; some burrow in more solid substances, as the *limnoria terebrans*, one of the marine *isopoda*, which too frequently effects the destruction of piers, dock-gates, etc., perforating them in every direction. Many of the E. are parasitic, some of them on whales, some even on prawns and other crustaceans. Some of the parasitic E. are destitute both of eyes and antennæ.

EDRISI, ABU ABDALLAH MOHAMMAD BNU ABDALLAH BNU EDRIS, AL-HAMUDI, SHERIF, also called AL EDRISI, AL-SIKILI (SICILIAN), or AL-RODJARI (ROGER's), one of the most eminent Arabic geographers, and a descendant of the royal family of the Edrisites—who traced their origin to Mohammed himself—was b. at Ceuta or Sibta (Civitas) in the year 1099. He studied at Cordova, and early distinguished himself by the extraordinary range and versatility of his talents. He excelled in nearly all the then known branches of science and art; but it was geography which at a very early age seems more than any other science to have attracted him. Having completed his studies, he traveled and visited Constantinople, Asia Minor, Egypt, Morocco, Andalusia, and the coasts of France and England. Roger II., king of Sicily, invited him, on his return, to his court, and lavished upon him all the honors which it was in his power to bestow. A favorite wish of this monarch—one of the most refined and liberal-minded men of his age—had long been to have a representation of the earth, founded on the most recent observations. He accordingly invited travelers from all parts of the world to assist him by sending their itineraries, their measurements of longitudes and latitudes, their observations and adventures—in short, all they had seen or heard on their journeys. The collection of this material occupied 15 years, at the end of which it was handed over to Edrisi. Thus guided, he drew up a map, on a globe of pure silver, weighing 450 Roman pounds (50,400 drachmas), in which the whole of the then known world was represented. He, like Ptolemy, divided it into seven climates, beginning at the equinoctial line and continuing northwards to the limits of extreme cold, and intersected each of these with eleven "regions," represented by perpendicular lines, without any regard to the political or physical features of the respective countries. In explanation of this map, he wrote a book (1153), *Nuzhat al-Moshtak*, etc., in which a full account is given of the towns, mountains, rivers, etc., proceeding from w. to e., according to the order of the climates. Careful as he was in observing and collecting, he could not, in the then state of society and communication, but fall occasionally into serious blunders; but on the whole his statements are peculiarly trustworthy; and being the clearest and most reliable exposition of the state of geographical knowledge in those days, the book remained the great and sole authority down to the time of the Portuguese discoveries. An extract of it was first edited at Rome in 1592, in Arabic, entitled *Nubian Geography*, and reprinted in the monastery of Khesruan, in the Lebanon, with Syriac characters, in 1597—both editions incorrect in the highest degree. The very title was a mistake, the editors having, by a misinterpretation of a passage, been led to believe that E. was a Nubian. Bernardino Baldi translated this extract into Italian in 1600, but his translation was never published. The first published translation was a Latin one, made in Paris (1619) by Gabriel Sionita and Johannes Esronita, a work teeming with the most absurd blunders; and Domenico Macri translated this Latin translation into Italian. Rosario Gregorio's Latin version of the portion referring to Sicily was published with the text in a collection of Tardia in 1790. Portions of the Arabic text, with comments, have been separately published; the chapters relating to Africa and to Spain by Hartmann (Göttingen, 1796); those concerning Syria by Rosenmüller (1828); and those on Africa and Spain again by Dozy and Goeje (Leyden, 1866.) The translation of E.'s whole work, in French, was made from two MSS. in the imperial library, by Jaubert, and published (Paris, 1830 and 1840), but it is, unfortunately, not sufficiently faithful. The full text has never been edited.

We shall only add that the incidents of E.'s life have given rise to interminable dis-

cussions. The year and place of his death, as also his creed, whether Mohammedan or Christian, still remain vexed questions.

EDSON, CYRUS, bacteriologist, b. Albany, N. Y., in 1857; graduated at the New York college of physicians and surgeons in 1881; became chief inspector of adulterated foods and offensive trades of the New York board of health in 1886, chief inspector of contagious diseases in 1887, sanitary superintendent in 1891, and health commissioner in 1895, and resigned in 1895. He gained wide repute for original researches in the lines of tubercular and diphtheritic diseases.

EDUCATION. *Educatio*, the Latin word from which our word education is derived, is used by Cicero to represent the earth as the *educator* and nourisher of all things. Tacitus uses *educare* to mean the nursing of infancy, but he limits the use of *educatio* to training. Quintilian, the ablest educational author among the Latins, and who was very precise in the use of words, applies *educatio* to preparatory instruction, but uses *institutio* to represent what we call academic instruction.

Among modern conceptions, that which was embodied in the ideal of the founders of the Prussian national system has been the most popular among recent writers, and perhaps the least satisfactory. By them education is stated to be, "the harmonious and equable evolution of the human powers." (See Bain's *Education as a Science*.) All correct definitions of training must refer to Plato, who said, "Good education is that which gives to the body and to the soul all the perfection of which they are capable." All conceptions of education must of necessity be colored by the philosophical views of the persons holding them, and also by the national ideal of what school work is to accomplish. Among eminent theorizers we have Pythagoras, Plato, Aristotle, Cicero, Quintilian, Abelard, Ratich, Comenius, Locke, Milton, Rousseau, Rabelais, Pestalozzi, Froebel, and Spencer. Each of these eminent scholars has held distinct views as to the aims, possibilities, and practical ideals of human training. But each of these views, although to some extent practical, were mainly theoretical conceptions of what education ought to accomplish under the most favorable circumstances. In the progress of human thought the *practical* ideal has been gaining in general popularity, and yet in Sparta there was a system of training that proposed to take away every force except that which would render the child of the greatest possible use to the state. In Rome, the dominant idea was *potestas*—power, glory, magnificence—but not the training of the masses so that each individual in the state could reach the highest development his nature was capable of, but the ability to command others and surround himself with a retinue of servants, an army of followers, and the power of commanding the obsequious homage of all with whom he might come in contact. During the middle ages the practical ideal was largely lost sight of, but since the Renaissance, and especially since the thoughts of Lord Bacon have influenced the popular mind, the practical ideal has been growing in power until, to-day, the average father has no thought that the school training of his son has any value unless it fits him to do something, in other words, to help him make a living. So it is that we have a multitude of trade, music, drawing, and business schools. Directly opposed to the practical is the *dogmatic* ideal. According to this, an education consists in mastering the technicalities of a course of study, in getting good marks, and graduating with honor. There have been traces of this ideal all down the ages; especially has it been powerful in shaping the educational practices of the Chinese, when little attention is given to the thought of the author studied, but the effort is devoted toward the memorizing of his words.

The first European in modern times who mapped out a formal course of study that should be followed by all students desiring to receive the best education was John Sturm. His intimate friend, Roger Ascham, the tutor of Mary, queen of Scots, and Elizabeth, advocated his ideas with such vigor and success that the great English public schools adopted, in the main, his methods, and until the time of Thomas Arnold followed with little variation his directions. This dogmatic ideal took so strong hold upon the minds of educators that it kept our great preparatory schools and colleges in bondage to a fixed curriculum, from which it was considered improper to depart.

In Sturm's course of study Latin and Greek held the prominent place, and so strenuous have teachers been in following, without proper variation, this ideal, that it was difficult to introduce mathematics and the sciences into the English public schools, and until within a few years no New England college required an examination in English as a requisite for admission to the freshman class. A notable application of this dogmatic thought has been made in arranging public school courses of study, and so strict have some superintendents been in requiring that all teachers of a certain grade should do certain prescribed work at exactly the same time, and in the same way, that one supervisor boasted that he knew what each teacher in his employ was doing at a certain hour and minute. With the progress of correct educational thought in the past few years this dogmatic idea has lost much of its power, and more freedom is given to individual teachers in training the pupils under their care for complete living. This change has taken place through the influence of educational reformers, whose works will be briefly referred to in another part of this article. No sketch of educational work would be complete without reference to the doctrines taught by Christ, and the practices of the Christian church. These doctrines may be divided into two parts, spiritual and practical. In conducting the education of a child the Christian teacher assumes that nothing but a union of the soul with Christ will suffice to drive out the presence of sin, and

fortify the life against its attacks. In practical duties self-abnegation is the end to be reached. This ideal is contained in the golden rule. During the Christian centuries the world has been powerfully influenced by these two doctrines.

The theocratic idea of education held by the Hebrews has been more faithfully followed by the Semitic race than any other conception. The Jews believed that they were the chosen people of God, and from their earliest childhood they were looked upon as religious beings, and for hundreds of years the elders and fathers were the teachers of the people. The children were required to learn the laws of God, to write them on leaves, on sand, and, in later times, on vellum. This learning by heart of select portions of Scripture, and a simple notation by the letters of the alphabet used as figures, constituted all of their elementary education. One characteristic of Hebrew education was its industrial system—all children, of high and low birth, were obliged to learn a trade. Thus, Christ was a carpenter, Paul a tent-maker. Rabbi Judah said that "he who teacheth not his son a trade does as if he taught him to be a thief"; and Rabbi Gamaliel said, "he who hath a trade in hand is like a vineyard that is fenced."

No system of ancient education is more directly connected with us, and can with more profit be studied by modern students, than the Athenian. Its very essence is expressed by Aristotle in his "Politics" when he asks, "Is education to be chiefly directed to things of common and vulgar use, subservient to bodily accommodation and productive of external prosperity; or ought its main business to consist in the sharpening, fortifying, and ennobling the mind?" Elementary education was comprehended under four divisions, grammar, gymnastic, music, and drawing. Under grammar was included writing, the elements of calculation, and composition; under gymnastic, the training of the body in strength and endurance. Music was intended not only as a pastime, but for the purpose of giving harmony and beauty to the body and soul. Under drawing was comprehended geometry and the arts of design, as painting and sculpture. There were, in Athens, and in other Greek cities, schools for the instruction of children. In some of these the teachers were paid by the state, although this was not general. They were recognized by Solon, who provided against abuses in them detrimental to children. The gymnasia were established for the special training of the body, and were intended to promote the equable development of all of its parts. This education commenced about the fourteenth year, when systematic attention was given to the practice of athletics. So much can be said concerning Greek education that it is difficult to decide what to omit. The student of modern education will find a mine of wealth in the methods of Greek culture, from which may be obtained principles and practices of inestimable value to the teacher in this busy age. It is through a careful study of the forces that have both promoted and retarded the progress of the human race that eminent thinkers of modern times have been enabled somewhat clearly to ascertain the true object of teaching.

Probably the most comprehensive idea of what correct education should do was expressed by Bishop Temple, who said that, "It is the power whereby the present ever gathers into itself the results of the past, and transforms the human race into a colossal man whose life reaches from the creation to the Day of Judgment. The successive generations of men are days in this man's life. The discovery of inventions which characterized the different epochs of the world's history are his works. The creeds and doctrines, the opinions and principles of the successive ages are his thoughts. The state of society at different times form his manners. He grows in knowledge, in self-control, in visible size, just as we do, and his education is in the same way, and for the same reason, precisely similar to ours." Pascal expressed the same thought when he said, "The entire succession of man through the whole course of ages must be regarded as one man, always living and incessantly learning."

These broad conceptions of educational processes are essentially modern, and the more they take possession of the minds of the people, the more and more will it be realized that education does not consist in following dogmatic courses of study, memorizing little understood statements, or mastering set tasks, but rather the joyous and free exercise of all the human powers in the search for truth.

A brief review of educational progress, especially in this country, will be necessary in order to know what advancement has been made, and what are the special needs of our times. At the Revival of Learning scholars all at once woke up to the realization of the fact that a mine of literary wealth had been lying just within easy reach, but of which, for hundreds of years, they had been ignorant. The thought of the world was quickened into intense activity. Convents were searched, and libraries of monasteries ransacked for lost manuscripts of classical works. The search was rewarded with wonderful success. Aristotle and Plato were re-translated from the original Greek, and new editions of Latin authors appeared with marvelous rapidity. The new art of printing, which reached a great degree of perfection early in the sixteenth century, greatly aided the dissemination of this new knowledge. The old world, that seemed to have been asleep for five hundred years, opened its eyes in amazement and joy upon a new literature, and so, new thought. The works of the ancients were almost worshipped, and he who could write and speak, with ease and fluency, Ciceronian Latin was considered among the greatest scholars of his time. Ecclesiastics became accomplished classicists, cathedral schools were opened everywhere, especially for the study of Latin. At the opening of the sixteenth century Europe had fairly inaugurated a new

educational era. Just at this time the age of discovery and maritime adventure began—the New World had been found—but this was only the commencement of far more dangerous voyages, and far more exciting adventures than Columbus ever experienced. Books containing a little truth, with a good deal of fiction, and illustrated in the most sensational manner, were published in many countries of Europe. At the beginning of the seventeenth century schools were founded everywhere, and no order was more active in accomplishing this work than the Jesuits. So popular did their schools become that many Protestant parents intrusted their children to them for instruction. In Germany princes as well as educators exerted themselves to improve and multiply their schools. Before this time John Sturm had established a gymnasium in Strasburg, where he taught forty-five years, and was greatly influential in fixing methods of instruction in all of Europe.

Whether the Jesuits did more than Sturm to establish the methods of classical teaching is a disputed question, but Sturm said, "I have observed what writers the Jesuits explain, and what method they follow, and it differs so little from ours that it seems as if they had drank from our fountain." Yet it is evident, as Von Raumer has said, that "Protestants and Catholics sought the same object in their efforts for literary culture." The ideal was Ciceronian Latin eloquence. It was, in fact, a pure philological training in which almost everything else was lost sight of except that speaking and writing, French, German, and English were not valued as literary languages, and Latin became the means of communication between all who laid any claim to having a liberal education.

Among those who attempted to reform these systems of teaching were first, Wolfgang Ratich, and after him Johann Amos Comenius. Both of these men devoted their lives to the advocacy of their ideas—Ratich with moderate, and Comenius with a great degree of success. It was urged by them and their followers that the common method of instruction of their time was "a blind groping, without road or object." They declared that words were put too soon in the mouths of scholars; that they were required to name and describe things strange to them, and so, many school exercises were "empty talking without any real substance." They insisted that all pupils, even the youngest, should understand what they were required to say and do, and should be able to give a clear account of their thoughts, in correct words and sentences made by themselves. Ratich urged the necessity of first reading and speaking the mother tongue correctly and fluently. Hebrew, Greek, and Latin should be studied in the order named, but the German language should be the medium of communication in all German schools. He divided his school into six classes, in the three lowest of which the mother tongue was solely used. In the fourth Latin was commenced, and in the sixth, Greek. The teachers of the lowest classes need know no language but German, but he "should form the tongues and languages of the new scholars according to pure Misnian dialect, by daily prayer, short Bible texts, and questions in the form of ordinary conversation."

The favorite maxim of Ratich and his followers, "*Per inductionem et experimentum omnia*," was purely Baconian, and shows that the spirit of this philosopher influenced, at least to some extent, this educational reformer. Comenius was a man of greater breadth and scholarship than Ratich. He wrote several valuable books, one of which, the "*Opera Didactica*," filled more than a thousand folio pages, and is "a most rich treasure of acute and profound thoughts." But the book that gave Comenius his greatest fame was his "*Orbis Pictus*," which appeared in 1657, and was for a hundred and fifty years the most popular text-book of the world. It was a principle of Comenius that teaching should begin with the presentation of actual things. In the *Orbis Pictus* everything was illustrated by pictures—the book is full of figures and cuts, "by the help of which the attention will be awakened and the imagination pleased." This was the forerunner of the thousands of illustrated school-books which have appeared, but among all that have followed not one has been more minutely or profusely illustrated than this. Comenius must be considered the first learned educational reformer of recent centuries, and the time will never come when his opinions will not be quoted with respect.

Except the writings of Comenius, no book has made a more decided impression upon the educational world than Jean Jacques Rousseau's *Emile*. Its plan of instruction is to allow the youthful mind to unfold without restraint. Necessity alone is to regulate the education of a child until reason is strong enough to be its guide.

The reading of the *Emile* by J. Heinrich Pestalozzi was the means of leading him to devote his life to the practice of education. Like Rousseau, his principles were founded entirely upon the following of nature. It took him a long time to find the means of reaching the best results, but in the end his method was so clearly shown that no teacher who desires to follow him need be at a loss to know what to do. No modern educational reformer has exerted so strong an influence in taking unreasonable and unnatural practices out of the schools, and introducing in them the correct order in developing a human being. The name of Pestalozzi is deservedly held in high esteem by all students of modern educational science.

From Comenius to the United States is but a single step, for he was invited to become president of Harvard college. Fifteen years after the landing of the Pilgrims public schools were established in Massachusetts, and all children were obliged to attend them. A fine of \$50 was imposed upon the parent for failure in doing his duty. Tuition was

required of all who were able to pay it. In 1683, every town of 500 inhabitants in Massachusetts was obliged to maintain a grammar school in addition to the primary school, and those towns failing to do so were taxed and the proceeds given to the next adjoining town. In 1636 the legislature of Massachusetts voted £400 toward the founding of a college. It was named in honor of Rev. John Harvard, who left £700 in 1638, and a library of 300 volumes to the new institution. The Dutch settlers on Manhattan Island established a school in 1633; others followed, which were supported by the town and the church. When the English took possession of the island, in 1674, every town and village in the colony had a public school, in which tuition was given to all unable to pay. Few public schools were found west and south of New York before the commencement of the present century, although higher instruction was encouraged, and the charter of the college of William and Mary, in Virginia, was granted in 1688. It provided for a college president and six masters, who were to give instruction in all the branches of a liberal education. This institution continued in active existence until the outbreak of the civil war. In 1746 the colonial legislature of New York authorized the raising of money by a lottery for the establishment of a college, the proceeds of which were devoted to the founding of King's college, now Columbia. The western states learned wisdom from the experience of the old colonies, for the ordinance of 1787, organizing the Northwestern Territory, provided that "religion, morality, and knowledge being necessary to good government and to the happiness of mankind, schools and the means of education shall be forever encouraged." Public lands were designated for the support of schools, and each of the new states levied taxes for their maintenance. The school system of New York must always look to Governor Clinton as its father, for on his recommendation, in 1795, "the sum of \$50,000 was appropriated for five years for the support of common schools. This has increased from year to year, until in 1890 the sum raised in the state of New York by direct taxation for the support of schools amounted to \$3,600,000. In all the states of the Union the educational tax has so increased that the income from this source, according to the commissioner of education, amounted, in 1890, to the enormous sum of \$132,000,000.

Public schools that fifty years ago charged tuition to those able to pay, are now entirely free to all of school age, and in many cities text-books and other necessary appliances are furnished. There were no active efforts in this country to promote a generous, free, public education until near the close of the last century. Bronson Alcott, the well-known author, born in Massachusetts in 1799, speaking of schools in the early part of the present century, said that, "until within a few years no studies have been permitted in the day school but spelling, reading, and writing. Arithmetic was taught by a few instructors one or two evenings a week." Slates were unknown for school use until after the Revolutionary war, and blackboards have been common only during the past fifty years. The Rev. William Woodbridge, a successful teacher in the early part of this century, said that in Connecticut in his younger days he has known boys who could do something in the first four rules of arithmetic, but girls were never taught it. When the republic was established the people began to realize that without universal intelligence the union of the states could not be permanent. School funds were created in all the New England states, but owing to a lack of unity of action, the progress was not so rapid in New York, and the states west and south. As late as 1865 rate bills were in use in New Jersey, New York, Rhode Island, Michigan, and Connecticut. But it is now generally admitted that the giving of an elementary education to each child in the country, both rich and poor, is a debt the state owes and must pay. In many of the states the whole work of conducting the schools is given into the hands of either a board of education, or a superintendent of public instruction, who reports to the legislature at its meetings. In the city of New York the Public School Society was established in 1805, and had charge of all public instruction in the city. Its first president was De Witt Clinton, and it continued to provide public instruction until 1853, when it voluntarily turned over to the city its entire system of schools and property to the amount of \$600,000. George Clinton laid the foundation of the common school system of New York, and, in fact, of the whole country, in 1797, and De Witt Clinton crowned a long life of honor and usefulness by requiring the state to give to every child within its borders the means of getting an elementary English education, free of all expense. Strong efforts have been recently put forth to make all education, both higher and lower, free. By a vote of the people of New York a free academy for boys was established in 1847. This has become the College of the City of New York, for the support of which the city annually appropriates the sum of \$150,000. The Female Normal School, now the Normal College, was founded in 1870, and receives an annual support from public funds to the amount of \$125,000. Public high schools, giving the elements of a liberal education, have been established in most of the cities and larger towns in the Union, and in many instances the buildings in which these schools assemble are among the best constructed and most thoroughly equipped public edifices in the country. State universities, supported by public funds, and largely attended by both young men and women, have been founded by nearly all the states, and in some instances, as Ann Arbor, in Michigan, and Cornell, in New York, they have become institutions of great effectiveness. The establishment and permanence of these colleges have been greatly promoted by the aid they have received through grants of public lands from the general

government. Independent and denominational colleges have increased to such a degree that each leading denomination has one and sometimes three colleges in each state.

Although the first normal school of which we have any mention was established in Rheims, France, in 1681, by the Christian Brothers, yet it was not until 1840 that the first building was erected in this country for a public normal school, and dedicated, at Bridgewater, Mass. The promoter of this enterprise was the distinguished Horace Mann, the foremost American educator of this century. At the present time every state in the Union has its normal school, and some have several, entirely supported by public funds, in which teachers are trained in the theory, science, and art of their calling. The state of New York has 12 of these schools, supported by annual appropriations amounting in the average to more than \$200,000. The first university to establish pedagogy as a distinct professional department of study, on the same grade as law, medicine, and theology, was the university of the City of New York. Its school of pedagogy was inaugurated with definite courses and degrees in May, 1890. In addition to the many educational forces already mentioned, there are in the United States and Canada a large number of scientific, theological, law, and manual-training schools. Each state has its deaf, dumb, and blind institutions, as well as soldier-orphan, idiot, and reformatory schools. In the different parts of the United States there are about one hundred and fifty periodicals devoted exclusively to the discussion of educational questions. Next to business, religion, and politics, no subject to-day engrosses so much of the thought of the intelligent people of the civilized world as education, and it is safe to predict that the coming generation of boys and girls will get far more good from their school training than has ever been realized during the history of the human race.

The reader is referred to the following standard works: Pestalozzi, *Sämmtliche Schriften*, 5 vols. (1826); Tommaseo, *Sull' Educazione* (1851); Morley, *Defence of Ignorance* (1851); Horace Mann, *Letters and Reports on Education* (1867); Brochard, *History and Progress of Education* (1860); Markby, *Practical Essays on Education* (1868); Mullinger, *The Schools of Charles the Great* (1877); Barnard, *German Educational Reformers* (1878); Jolly, *Education, its Principles and Practice* (1879); Thring, *Education and the School* (1876); Kiddle and Schem, *Cyclopædia of Education* (1877); Kingsley, *Health and Education*, 2d ed. (1887); O. Browning, *Introduction to the History of Educational Theories* (1882); Mahaffy, *Old Greek Education* (1882); Galloway, *Education, Scientific and Technical* (1881); Paulsen, *Geschichte des Gelehrten Unterrichts auf den Deutschen Schulen und Universitäten* (1885); Painter, *History of Education* (1886); Herbert Spencer, *Education, Intellectual, Moral, and Philosophical* (1886); Rousseau, *Emile*, with notes by Jules Steeg (1885); Rosenkranz, *Philosophy of Education* (1886); Bain, *Education as a Science* (1886); Sonnenschein, *A Cyclopædia of Education*, ed. by Fletcher (1889); Rosmini Serbati, *The Ruling Principles of Method Applied to Education*, English translation (1887); Guyau, *Education et Hérité* (1889); Jacobi, *Physiological Notes on Primary Education* (1889); Quick, *Essays on Educational Reformers*, 2d ed. (1890). Also the following articles: ACADEMY; AGRICULTURAL EDUCATION; CHAUTAUQUA; CO-EDUCATION; COLLEGE (and the names of the various colleges); COLLEGES, AMERICAN; COLLEGIATE EDUCATION FOR WOMEN; COMMON SCHOOLS; DEGREE; EVENING SCHOOLS; FROEBEL; GRAMMAR SCHOOLS; GYMNASIA; HAMILTONIAN SYSTEM; INDUSTRIAL SCHOOLS; INFANT SCHOOLS; KINDERGARTEN; MANUAL TRAINING; MILITARY SCHOOLS (and their various names); MONITORIAL SYSTEM; NATIONAL EDUCATION; NAVAL SCHOOLS (and their various names); NORMAL SCHOOLS; PEDAGOGY; PESTALOZZI; POLYTECHNIQUE; REFORMATORY SCHOOLS; SCHOOLS OF LIBRARY ECONOMY; TECHNICAL EDUCATION; TECHNOLOGY; UNIVERSITY (and the names of various universities); UNIVERSITY EXTENSION.

EDUCATION, COMMISSIONER OF, the chief officer of the bureau of education, at Washington. He is appointed by the president and senate, and his duties are "to collect such statistics and facts as shall show the condition and progress of education in the several states and territories;" to diffuse such "information respecting the organization and management of schools and school systems and methods of teaching as shall aid the people in the maintenance of efficient school systems, and otherwise promote the cause of education;" and also "to present annually to congress a report embodying the result of his investigations and labors, together with a statement of such facts and recommendations as will, in his judgment, subserve the purpose for which the department is established." The office was established in March, 1867.

EDUCATION, MILITARY. See UNITED STATES MILITARY ACADEMY.

EDUCT is a term employed in chemistry to indicate that the body to which it is applied is separated by the decomposition of another in which it previously existed as such. It thus stands in opposition to *product*, which denotes a compound not previously existing, but formed during decomposition. Thus, the volatile oils which pre-exist in cells in the fruit and other parts of plants, and oil of sweet almonds obtained by pressure, are educts; while oil of bitter almonds is a product.

EDWARD, or **EADWARD**, I. (THE ELDER), d. 925; king of the Anglo-Saxons, eldest son of Alfred, succeeded his father in Oct., 901, when about 30 years of age, having previously distinguished himself by defeating the Danes. His cousin Ethelwald, who disputed Edward's right of succession, and endeavored to obtain the throne, was killed in battle. The reign of Edward was turbulent, but at length he subdued the Danes.

EDWARD, or **EADWARD**, II. (THE MARTYR), d. 978; king of the Anglo-Saxons, succeeded his father Edgar in 975 A.D., at the age of 13. His succession was contested

in behalf of his younger brother, only 7 years old; but the powerful influence of St. Dunstan secured Edward's triumph. He died by treachery. Returning exhausted from the chase he was lured to the residence of Elfrida (the mother of the contesting prince) and there stabbed in the back.

EDWARD THE CONFESSOR, king of the Anglo-Saxons, was b. at Islip, in Oxfordshire, about the year 1004. On the death of his father, Ethelred, in 1016, Canute the Dane obtained possession of the throne, and in the following year married Emma, the mother of Edward, by whom he had two sons, Harold and Hardicanute. Until the death of Canute in 1035, E. lived in Normandy; he then made an ineffectual attempt to establish his authority in England; but his mother Emma had now transferred her affections to her younger children; and she exerted all her influence and energy in favor of Hardicanute, who, on the death of his brother Harold in 1040, became sole ruler of the Anglo-Saxon kingdom. Hardicanute, however, was generous enough to invite his half-brother to England, whither accordingly E. went, and was honorably received. On the death of Hardicanute in 1042, E. was declared king. The person chiefly instrumental in bringing about this result was earl Godwin, whose only daughter, Editha, was married to the king in 1044. The lady only became his queen, not the partner of his bed. For this unusual exhibition of asceticism, the honor of canonization, and the title of Confessor, were conferred on him, about 100 years after his death, by Pope Alexander III. His first act after his accession was to deprive his mother of all her treasures—taking even the cattle and corn from her fields, and, according to some accounts, endeavoring to compass her death. The whole of E.'s reign is simply the record of the growth and struggles of the Norman or court party with the national or Anglo-Saxon party; for an account of which see articles **GODWIN** and **HAROLD**. E.'s wars with the Welsh in 1057 and 1063, and with the Northumbrians in 1065, were short and successful. He died 5th Jan., 1066. See Green's *History of the English People* (1877-80), vol. I.

EDWARD, the **BLACK PRINCE** (See **EDWARD III.**), 1330-76; son of Edward III. of England, and Philippa. He was created duke of Cornwall in his eighth year, and a year later, during his father's absence in France, was appointed nominal guardian of the kingdom. He held this office also in 1340 and 1342; and was created prince of Wales on the king's return in 1343. Three years later he accompanied his father to France, and in the battle of Crécy led the most victorious division of the army. He also shared his father's glory in the victory over the Spanish fleet at the battle of L'Espagnols-sur-Mer. In 1355, he was given command of the chief army in the French war, landed at Bordeaux, and after several smaller successes, in 1356 he gained the victory of Poitiers, capturing the French king, whom he carried captive to London in 1357. In 1361, during the short peace following king John's ransom, he married his cousin Joanna, the "fair maid of Kent," of whom he was the third husband, and being created duke of Aquitaine, crossed over to his new dukedom, where he ruled successfully and peacefully for a time. Making an entangling alliance with Pedro, the deposed king of Castile and Leon, although victorious he found himself burdened with the expenses and losses of a profitless war, and for the excessive taxes laid upon his duchy he was summoned to account at Paris. To this summons he replied haughtily that he would come "helm on head, and with 60,000 men." This led to a rupture between France and England. The French planned a double invasion of English territory. The duke of Anjou, commanding one expedition, besieged Limoges, which had been ceded to the English by the treaty of Bretigny and formed part of the principality of Aquitaine. The city surrendered by the treachery of its bishop. The Black Prince, enraged by this act, after a siege of a month, recaptured the city by assault, and put to the sword 3,000 of its inhabitants. This madness of cruelty is the chief blot on the fame of the prince. It is only partially explained by his disordered health, which itself was perhaps due to the irritation of seeing the English power waning in France, in spite of all his victories. He was compelled, by the advice of his physicians, to return to England the following year, 1371, where he lingered in continually failing health for five years. In these years he saw the loss of Aquitaine to England, but he did good service to the country in opposing the corrupt and oppressive influences which surrounded the king, and by his help parliament was able to pass acts against the king's mistress, Alice Ferrers, and in restraint of the dangerous ambition of John duke of Lancaster.

EDWARD I., King of England, was the eldest son of Henry III. by his wife Eleanor, daughter of Raymond, count of Provence, and was b. at Westminster, June 16, 1239. That union of valor and intelligence which characterized him was exhibited at an early period. At the commencement of the struggle between Henry and his barons, prince E., who was then governor of the duchy of Guienne, came over to England, and boldly declared his dissatisfaction with his father's conduct. Subsequently, he took the king's side in the war, and by his vigorous generalship put an end to the insurrection in a few years, but there is no evidence to show that he had changed his opinion of Henry's policy; and it is remarkable that he himself, during the whole of his reign, carefully avoided coming into collision with his nobles. When the last of the crusades was organized, at the instigation of Pope Gregory X., Prince E. arranged with Louis, king of France, to take part in it. Louis died before reaching Palestine, but the former landed

at Acre in 1271. Nothing, however, of any consequence was achieved; and in the following year he set out on his return to England. At Messina, he heard of his father's death, whereupon he proceeded to France, and did homage to Philippe III. for his French possessions, arriving in England 25th July, 1274. He and his queen, Eleanor, were crowned at Westminster on the 19th of Aug. following. His first military expedition, after his accession to the throne, was directed against the Welsh. After a contest of nearly 10 years—in the course of which the famous prince Llewellyn was slain at Llanfair, 11th Dec., 1282—Wales was finally subdued and incorporated with England. His next ambition was to possess himself of Scotland. The death, in 1290, of Margaret, granddaughter of Alexander III., and known as the maiden of Norway, who was to have been married to E.'s son, seemed to have frustrated his design; but the selfishness of the 10 competitors for the Scottish crown who now appeared, induced them to acknowledge E. as *Lord Paramount* of Scotland, each hoping that he would thereby secure the English monarch's support. The competitors were also foolish enough to make him umpire among them, or perhaps it would be more correct to say, they were not powerful enough to refuse his arbitration. Be that as it may, E. decided in favor of John Baliol at Berwick, 17th Nov., 1292; and Baliol immediately took the oath of fealty to him; and on the 26th of Dec. did homage to the English king for his crown at Newcastle. The patriotism and pride of the Scottish nation took fire at such humiliation, and in a short time Baliol was hurried by his subjects into a war with England. In 1296, E. entered Scotland, devastating it with fire and sword. He penetrated as far as Elgin, compelled Baliol to resign the kingdom, and governed the country by means of his own officers. It was during this expedition that he carried off from the cathedral of Scone the celebrated stone on which the kings of Scotland used to be crowned, and which is now in Westminster abbey. A second rising took place in Scotland in the following summer. The leader on this occasion was William Wallace (q. v.), whom tradition represents as the most heroic and unselfish of patriots. He was completely successful for a time, chiefly it is to be supposed on account of the absence of Edward. In the spring of 1298, however, that sovereign again made his appearance in Scotland, and gave battle to Wallace at Falkirk, on the 22d of July. Partly through treachery, and partly, no doubt, through the superior generalship of E., who is considered to have been the first military commander of his time in Europe, the Scottish forces were entirely defeated. The next five years were spent by the English king in reducing the country to obedience—with very imperfect success, however. In the summer of 1303, he led a third large army into Scotland, and once more spread havoc and ruin to the shores of the Moray firth. The last castle that held out against him was Stirling, which did not yield till the 20th of July, 1304. E. wintered at Dunfermline. Some time after this, Wallace either fell into his hands, or was betrayed, and on the 23d Aug., 1305, was hanged, drawn, and quartered as a traitor, at Smithfield, in London. E. now probably thought that he had no further danger to dread from Scotland, but if so, he was quickly undeceived. Robert Bruce, earl of Carrick, grandson of the chief rival of Baliol, suddenly left the English court, where he had been residing, in the beginning of 1306, unfurled once more the banner of Scottish independence, and on the 27th Mar. of that year was crowned at Scone. An English army, under the earl of Pembroke, was immediately despatched to Scotland; and at the close of the year, the king himself set out to chastise Bruce. But worn with the "sturt and strife" of many years, the cares of his own kingdom, and the anxieties of conquest, E. only lived to reach Burgh-on-Sands, a village beyond Carlisle, where he expired, 6th July, 1307, "in sight of that country," says lord Hailes, "which he had devoted to destruction."

E. possessed most of the qualities that go to form a great ruler: valor, prudence, inexhaustible energy, and pertinacity are visible in his whole career. He was ambitious, it is true, but in his age, ambition was looked upon as a virtue rather than as a crime; it was the natural accompaniment of kingly courage. His relations to Scotland were also unfortunate. Few people of any understanding, however, now doubt that the best thing possible for that country would have been a peaceful union with England, for at that time there was no hatred or jealousy between the two nations. The death of the maiden of Norway destroyed every chance of such a union, and the great mistake committed by E. was his endeavoring to bring about by force what could prove beneficial only when it was the result of voluntary agreement. The effect of his mad endeavor was to plant in the breasts of the two nations the *germs* of a hitherto unknown hostility, which, in subsequent generations, worked incalculable mischief, and the traces of which have not wholly disappeared even at the present day. As a civil ruler, E. is entitled to the highest praise. Immense progress was made during his reign in the establishment and improvement of law and order throughout the land, the reformation of civil abuses, and the restriction of ecclesiastical jurisdiction and encroachments. He has been called the English Justinian; and both Hale and Blackstone affirm, that "the very scheme and model of the administration of common justice between man and man was entirely settled by this king." Ireland and Wales participated in the benefits of English law. It was during E.'s reign, too, that the representation of the commons of England first became regular; but probably the greatest advantage obtained by the nation, was the declaration that the right or privilege of levying taxes resided in the parliament. In general, it may be said that E. ruled in

harmony with the ideas and desires of the best heads among his nobles and burgesses; and though touchy on the question of his prerogative, like every Plantagenet, and very cruel in his treatment of the Jews, he must be regarded, on the whole, as one of the most enlightened, liberal, and sagacious monarchs of his age.

EDWARD II., son of the preceding, was b. at Caernarvon, in Wales, 25th April, 1284, and in 1301, was created prince of Wales, being the first heir-apparent of the English throne who bore that title. He accompanied his father on his various expeditions into Scotland, and on the death of the latter at Burgh-on-Sands, he led the English army as far n. as Cumnock, in Ayrshire, after which he returned to his own country. At home, E.'s conduct was contemptible. While still a youth, he had conceived an extraordinary admiration and fondness for a witty, clever, but dissolute creature called Piers Gaveston, the son of a Gascon knight. After he became king, there was no limit to the honors heaped on the favorite. When he went to France, in the beginning of 1308, to conclude a marriage with Isabella, daughter of Philippe V., king of France, Gaveston was left guardian of the kingdom. The nobles were indignant, and demanded his banishment. Twice was Gaveston forced to leave England, but as often was he recalled by the weak monarch, whose love for him was sheer infatuation. At last the nobles rose in arms, besieged Gaveston in Scarborough castle, and having forced him to surrender, hanged him at Warwick, 19th June, 1312. Two years after this, E. invaded Scotland at the head of the greatest army ever collected in England—amounting, according to some historians, to 100,000 men. At Bannockburn, on the 24th June, 1314, he was encountered by Robert Bruce (q.v.), and defeated with immense slaughter. This victory put Scotland and England on equal terms for all time coming, and made the notion of a military subjugation of the former country by the latter be given up. Finally, in 1319, after numerous petty successes on the part of the Scotch, E. concluded a truce with them for two years. He now exhibited again his imbecile passion for favorites. The person selected on this occasion was Hugh le Despencer. Once more the nobles rebelled, and both Hugh le Despencer and his father were banished in July, 1321, but some months after, were recalled by E., and many of the nobles, among others, the earl of Lancaster, were beheaded in the following year. Immediately after, E. invaded Scotland for the last time, and penetrated as far as Culross, in Fife; but having achieved no particular success, he concluded a truce with that nation for thirteen years, and returned to England. A dispute now arose between him and Charles IV. of France, brother of his wife Isabella, in regard to the territories which he held in that country. Charles seized them, whereupon E. sent over Isabella to remonstrate, and, if possible, to effect an amicable arrangement between them. Isabella, it would appear, despised her husband, and disliked the Despenchers. Meeting at the French court many English nobles who, entertaining similar feelings, had left their country to avoid the enmity of the favorites, she was easily induced to make common cause with them against her husband and the Despenchers. At the same time, she formed a connection of a criminal kind with Roger de Mortimer, one of the most powerful of the exiles. This of course more thoroughly involved her in the plot against Edward; and having obtained possession of the young prince of Wales, afterwards Edward III., she embarked from Dort, in Holland, with a large body of malcontents, and landed at Orwell in Suffolk, 22d Sept., 1326. The queen and the banished nobles were soon joined by all the influential persons in England. E. fled, but was taken prisoner at Neath abbey, in Glamorganshire; the Despenchers, father and son, were executed; and the monarch himself, after being formally deposed, 25th Jan., 1327, was murdered in Berkeley castle, 20th Sept. of the same year. He left two sons and two daughters.

EDWARD III., son of the preceding, was b. at Windsor, 13th Nov., 1312, and ascended the throne, 25th Jan., 1327. During his minority, the country was governed nominally by a council of twelve nobles and bishops, but really by Mortimer and his paramour Isabella. On the 24th Jan., 1328, the young king married Philippa, daughter of the earl of Hainault; and two years after, resolving to take the power into his own hands, he seized Mortimer, and put him to death, 29th Nov., 1330, and banished his mother, Isabella, to her house at Risings (where she lived for twenty-seven years). He next invaded Scotland, to assist Edward Baliol, son of John Baliol, who, in the confusion that ensued on the death of the great Bruce, had made a descent on the country, and got himself crowned at Scone. A bloody battle was fought at Halidon hill, near Berwick, 19th July, 1333, in which the Scots were completely defeated. Baliol now assumed the authority of a king, and did homage to E. for his possessions, the result of which act was, that he had to flee the kingdom in a few months, for the thing most intolerable to the Scottish spirit was that any monarch should dare, or fancy he had a right, to surrender the independence of his country. In the course of three years, E. thrice invaded Scotland; but though he frightfully wasted the country, and brought armies with him such as could not be successfully opposed, he could not break the invincible spirit of the people, who, after each invasion had rolled over them like a flood, rose and rallied with a still more stubborn and impassioned resolution to be free. But the scene of E.'s great exploits was France. Charles IV. having died without a son, Philippe of Valois, the nearest heir by the male line, ascended the throne, under the title of Philippe VI. E. claimed the

crown in right of his mother Isabella, sister of Charles; but as the law of France expressly excluded females from enjoying sovereign rights, it is manifest that E.'s claim was utterly groundless. The English king admitted that his mother, being a female, could not inherit the crown of France, but affirmed that he, as her *son*, might. But it is clear that he could not receive from his mother rights to which she herself had no claim. Yet never was a bad cause ennobled with more splendid triumphs. E. declared war against Philippe in 1337. His first campaign was not very remarkable; but in 1346, accompanied by his eldest son, known as the black prince, he again invaded France, conquered a great part of Normandy, marched to the very gates of Paris, and on the 26th Aug., 1346, inflicted a tremendous defeat on the French at Crécy (q.v.). Here the black prince, though only sixteen, exhibited the courage and the prowess of a veteran, slaying with his own hand the king of Bohemia, who fought on the side of France. After some further successes, such as the reduction of Calais, a truce was concluded between the two nations for several years. Meanwhile, the Scots had sustained a severe defeat at Neville's Cross, near Durham, their king (David) being taken prisoner. In 1356, the war with France was renewed, and on the 19th Sept. of that year, the black prince obtained a brilliant victory at Poitiers, king John of France (Philippe having been dead for some years) falling into his hands. The Scotch monarch was released for a ransom of £100,000 in 1357, and king John in 1360, when a peace was concluded between the French and the English, by which the latter were to retain their conquests. King John, however, finding it not consistent with the honor or desire of his country that such a peace should be carried out, magnanimously returned to captivity, and died in London, 8th April, 1364. Shortly before this date, David, king of Scotland, whose residence in England had extinguished the little patriotism he ever had, entered into a secret agreement with E., in virtue of which his kingdom—if he died without male issue—was to be handed over to the English sovereign. Meanwhile, the Black Prince, who had married Joanna, daughter of the earl of Kent, had received from his father Aquitaine and Gascony, and ruled there for some time very prosperously; but ultimately involving himself and his father in a war with France, which was disastrous in its issues, he was obliged, in 1374, to conclude a truce for three years. E. waged war no more. In spite of his brilliant victories, in spite of the dazzling valor of his son, he was at the last unsuccessful. Neither in Scotland nor in France did he realize his desires. Affairs at home were no less unsatisfactory in the last years of his life. He quarreled with his parliaments, and the Black Prince led the opposition. The latter, however, died 8th June, 1376, in the 46th year of his age. E. himself expired on the 21st June, 1377, after a reign of 51 years. By his wife, Philippa, he had seven sons and five daughters, several of whom died young. He was succeeded by his grandson Richard, son of the Black Prince, who ascended the throne as Richard II.—The reign of E. was marked by the great progress made in law—a greater number of "important new laws being passed than in all the preceding reigns since the conquest." Among these laws were several indicating the increasing repugnance of Englishmen to ecclesiastical, and especially to papal jurisdiction. Trial by jury also now began to supersede other modes of trial. Justices of peace likewise make their earliest appearance in this reign, and legal proceedings were ordered to be carried on henceforth in English, and not in French. Sir James Mackintosh is of opinion, that though E.'s "victories left few lasting acquisitions, yet they surrounded the name of his country with a luster which produced strength and safety"—an opinion which appears, on the whole, to be well founded. It remains to be said that E.'s reign witnessed the culmination of chivalry, and in the black prince, possessed a splendid example of its virtues and its vices. The fine arts, especially architecture and poetry, also attained a grand development. Chaucer, Gower, and several eminent chroniclers, flourished at this time, and in the sphere of religious reform stands out the noble and thoroughly English figure of Wickliffe.

EDWARD IV., son of Richard duke of York, and great-grandson of Edmund duke of York, who was the 5th son of Edward III., was b. at Rouen, 29th April, 1441 (or, according to another account, in Sept., 1442). His original title was that of earl of March. It would be quite impossible, in the short space at our disposal, to clear our way through the jungle of family relations by which Richard duke of York, the father of Edward IV., traced his right to the throne. Suffice it to say, that in 1460 the bloody struggle between the *Yorkists* (the party headed by Richard duke of York, who at first professed only a desire to remove from the king, Henry VI., his pernicious counselors) and the *Lancastrians* (the party of the sovereign) ceased for a moment. The Yorkists, on the whole, had been victorious on the battle-field, and their leader contrived to induce parliament to appoint him Henry's successor. Shortly after, however, Henry's wife—the brave queen Margaret—raised an army in the n., and on the 31st Dec., 1460, encountered and overthrew York on Wakefield Green, the duke himself being slain. But this reverse was compensated for by the success of his son Edward, who, after routing the royal or Lancastrian forces, under the earls of Pembroke and Ormond, at Mortimer's Cross, near Hereford, marched towards London, which he entered on the 28th Feb., 1461. He immediately presented his claim to the crown to parliament, which admitted its validity, and on the 4th of Mar. ascended the throne as Edward IV., amid the acclamations of the citizens of London, with whom he was a great favorite. For three years

he had to struggle hard to keep his position. His first victory over the Lancastrians was obtained at Towton, in Yorkshire, 29th Mar., 1461, hardly one month after his accession. Finally, in May, 1464, a few days after the victory at Hexham, Henry himself fell into E.'s hands. This closed the war for a time. About this time, E. married Elizabeth Woodville, widow of sir John Grey. This marriage gave great offense to the earl of Warwick, by far the most powerful of E.'s adherents, who was at that time engaged in prosecuting an alliance between E. and the sister-in-law of Louis XI., king of France. In 1469, Warwick openly declared against him, joined queen Margaret, and compelled E. to flee the country. King Henry was released from the Tower, where he had been a prisoner for six years, and once more invested with royal authority. But in the spring of 1471, E. landed at the Humber, proceeded swiftly to London, seized the person of Henry, and was again hailed king by the inhabitants. Warwick now gathered an army, and hurried to encounter him. The two met at Barnet, where Warwick was defeated and slain, April, 1471. In the course of the next month, E. routed the Lancastrians at Tewkesbury, capturing both queen Margaret and her son, prince Edward. The latter was murdered the day after the battle; the queen herself, after an imprisonment of four years, was ransomed by the French monarch. E. died 9th April, 1483, the later years of his reign presenting few political incidents of any moment. E. was an able commander, as his numerous victories show, but he was dissolute in the extreme. It was during his reign that printing was introduced into England, as also silk manufactures. In law, few notable changes occurred, but the practice of indirect pleading dates from this period, which is also illustrated with the names of distinguished legists, such as Littleton and Fortescue.

EDWARD V., son of the preceding, was b. 4th Nov., 1470. The story of his life is brief and tragic. At the death of his father, he was living at Ludlow, in Shropshire, a boy of thirteen. When the news reached Ludlow, earl Rivers, his uncle by the mother's side, set out with him for London. Richard duke of Gloucester, however, contrived to obtain possession of his person at Northampton, and brought him to the capital himself, in the beginning of May, 1483. Towards the end of the same month, Richard was appointed protector of the kingdom. About the middle of June, the young duke of York, brother of Edward V., also fell into his hands. The two hapless boys were then removed to the Tower, and were never more heard of. The general, and in all probability the correct opinion is, that they were murdered by command of Gloucester himself. All attempts to whitewash "the bloody and devouring chief" have signally failed.

EDWARD VI., son of Henry VIII. by his wife Jane Seymour, was b. at Hampton Court, 12th Oct., 1537. The events which happened during his brief reign were of great importance, but they were of course brought about by others, E. being too young (he was not sixteen when he died) to exercise any personal influence on the statesmen or the tendencies of his age. On the death of Henry in 1547, Edward Seymour, earl of Hertford, became protector of the kingdom. He was attached to the principles of the reformation, and during his rule, great strides were made towards the establishment of Protestantism in England. The images were removed from the churches; refractory Roman Catholic bishops were imprisoned; the laity were allowed the cup at the ceremony of the Lord's supper; all ecclesiastical processes were ordered to run in the king's name; Henry's famous six articles (known as the Bloody Statute) were repealed; a new service-book, compiled by Cranmer and Ridley, assisted by eleven other divines, was drawn up, and ordered to be used, and is known as the *First Prayer-Book of Edward VI.* (see COMMON PRAYER BOOK); and the celibacy of the clergy ceased to be obligatory. In war, Seymour showed himself to be a brave general. During the first year of his protectorate, he invaded Scotland, on account of the refusal of the Scottish government to fulfill the contract into which it had entered with Henry VIII., by which it was agreed that Mary queen of Scots should marry Edward. The battle of Pinkie followed, on the 10th Sept., 1547, in which the Scots were completely beaten; and Seymour, now duke of Somerset, might have inflicted most serious damage on the whole country if his presence had not been required at home. He returned to find that his brother, lord Seymour, had been caballing against him. Somerset had him arrested, tried, and condemned for treason, and on the 20th of Mar., 1549, he was beheaded on Tower Hill. In the summer of the same year the protector quelled an insurrection of the populace headed by one Kett, a tanner; but in the course of a few months, a more dangerous adversary appeared in the person of John Dudley, earl of Warwick, whose party, by dint of insinuations against Somerset, excited the nation against him, and at last compelled the king to sign his deposition. On the 14th of Oct., Somerset was placed in the Tower; and on the 1st of Dec., 1551, he was tried before the house of lords for treason, condemned, and executed, 22d of Jan., 1552. The people regretted, with good reason, his death, for Dudley was both a worse and a weaker man than himself. Before Somerset's execution, Dudley had been created duke of Northumberland. He was himself (judging from his dying declaration) a Catholic, but he certainly took no means to re-establish the old religion. His great aim was to secure the succession to the throne of England for his family. With this view, he married his son, lord Guildford Dudley, to lady Jane Grey, daughter of the duchess of Suffolk, to whom, by the will of Henry VIII., fell the crown, in default of issue by Edward, Mary, or Elizabeth. Northum-

berland now worked upon the weak and dying Edward to exclude Mary and Elizabeth, and nominate lady Jane Grey as his successor. E. at last consented, and a document settling the succession on this lady was drawn up in June, 1553. The king lived only a few weeks after, dying on the 6th of July. Subsequent events entirely frustrated Northumberland's design. King E., during his short reign, founded a great number of grammar-schools, which still exist, and are known as *king Edward's schools*.

EDWARDES, Sir HERBERT BENJAMIN, 1819-68; b. England; early in army service as a cadet in India; in 1841, ensign of the 1st Bengal fusiliers, with which regiment he remained five years, improving himself especially in the native languages. In the Sikh war he was aid to viscount Gough, the English commander-in-chief. After the war he continued in responsible positions in the civil service, but was soon again on military duty, doing service so brave and important as to receive the thanks of parliament. He was commissioner of the Peshawur frontier at the time of the Sepoy rebellion, and raised and sent a large force to aid in the siege of Delhi. For his many services he received the successive decorations of C.B., K.C.B., and K.C. of the star of India. He received the degree of LL.D. from the university of Cambridge. He published *A Year on the Punjab Frontier in 1848-49*.

EDWARDS, a co. in s.e. Illinois, bounded on the s.e. by the Little Wabash, reached by the Louisville, Evansville and St. Louis consolidated railroad; 220 sq. m.; pop. '90, 944. The surface is forest and prairie, producing wheat, corn, wool, tobacco, etc. Co. seat, Albion.

EDWARDS, a co. in s.w. Kansas; formed and organized in 1864; crossed by Arkansas river, and Atchison, Topeka, and Santa Fé railroad; surface rolling, scantily timbered; 612 sq. m. Pop. '90, 3600. Co. seat, Kinsley.

EDWARDS, a co. in s.w. Texas, formed in 1858, organized in 1883; 2316½ sq. m. Pop. '90, 1970. Co. seat, Rock Springs.

EDWARDS, AMELIA BLANDFORD, b. in London, 1831. She began writing for the press at an early age, and was afterward connected with some of the chief literary and political journals in England. She is also known as novelist, traveler, and Egyptologist. Among her works are, *My Brother's Wife*, 1855; *Hand and Glove*, 1859; *Half a Million of Money*, 1855; *Debenham's Vow*, 1870; *In the Days of My Youth*, 1873; *A Thousand Miles up the Nile*, 1877; and *Pharaohs, Fellahs and Explorers* (1891). In 1889 she lectured on Egyptian subjects in the United States, and received several degrees from American colleges. D. April 16, '92.

EDWARDS, BELA BATES, D.D., 1802-52; b. Mass.; graduated at Amherst, and studied theology at Andover theological seminary. In 1828, he was secretary of the American education society, and from 1828 to 1842, the editor of the organ of that society, the *American Quarterly Register*. In 1833, he started the *American Quarterly Observer*, which was soon united with the *Biblical Repository*, Dr. Edwards continuing as editor. From 1844 to 1852, he was editor of the *Bibliotheca Sacra*. In 1837, he was professor of Hebrew at Andover, and in 1848, of biblical literature. Among his works are the *Eclectic Reader*; *Biographies of Self-taught Men*; the *Missionary Gazetteer*; sermons, addresses, etc.

EDWARDS, HENRI MILNE. See MILNE-EDWARDS, HENRI.

EDWARDS, JONATHAN, a celebrated American divine and metaphysician, was b. at Windsor, in the state of Conn., 5th Oct., 1703, entered Yale college in 1716, took his degree of B.A. in the following year, and in 1722 was licensed to preach the gospel. Towards the close of 1723, he was appointed tutor of Yale college, an office which he filled with distinguished success. In 1726, he accepted an invitation to become colleague to his maternal grandfather, Mr. Stoddard, in a church at Northampton, and was ordained in Feb., 1727. Here he labored with intense zeal for more than 23 years, at the end of which period he was dismissed by his congregation. The immediate cause of the rupture between him and his hearers, was his insisting that no "unconverted" persons should be allowed to approach the Lord's table; but some years before, he had alienated the regards of a large number of the influential members of the church by denouncing the reading and circulation of certain books which were immoral and injurious, and by attempting to make a public example of the offenders. E. was a powerful and impressive preacher, somber and even gloomy in his religious opinions and sentiments, but earnest, unaffected, and nobly conscientious. During the famous "revival" of 1740-41, he was much sought after as a preacher, and is in fact often regarded as the originator of that movement. Certain it is that as early as 1734, a local manifestation of religious enthusiasm had taken place in his own parish, of which he published an account, entitled *A Faithful Narrative of the Surprising Work of God, in the Conversion of many Hundred Souls in Northampton*. The quarrel between E. and his congregation shows, however, that the "revival" had not exercised any very strong influence on the community in general, since only a few years elapsed between the ecstasies of devotion and the circulation of obscenity. After his dismissal in 1750, E. became a missionary among the Indians of Massachusetts. While residing at Stockbridge in that state, he composed his famous treatises on the *Freedom of the Will* and *Original Sin*. In 1757, he was chosen president of Princeton college, New Jersey, whither he proceeded in Jan., 1758, but was cut off by small-pox on the 23d of Mar. in the same year.—E. will always be considered a master in dogmatic theology. Calvinism had

probably never so powerful a defender. According to the late Robert Hall, "he ranks with the brightest luminaries of the Christian church, not excluding any country or any age since the apostolic." His great characteristics are depth and comprehensiveness of argument; and were it not that the age for such discussions as E. loved is gone by, few writings would be more worthy of patient study than those of this illustrious divine. Besides the works already mentioned, E. wrote a *Treatise concerning Religious Affections*; the *History of Redemption*; a *Dissertation concerning the End for which God created the World*; and a *Dissertation concerning the True Nature of Christian Virtue*. The last three were posthumously published. A complete edition of E.'s works was published by Dr. Timothy Dwight in 10 vols. (1809), and another at London in 1817. A third was published in 1840, containing an essay by Henry Rogers, and a memoir by Sereno E. Dwight. Also see the memoir by Rev. A. V. G. Allen (Boston, 1890).

In all accounts given of Jonathan Edwards, he is sufficiently celebrated as a severe reasoner and profound writer on metaphysical themes. But they who would understand the influence which he has already exerted, and estimate rightly that which he will continue to exert, must not neglect other points of his nature and work. 1. His humility, modesty, and serenity of spirit endeared him to his friends and made him appear amiable to all who conversed with him. As a Christian he was an example of rational virtue and religion. In him men saw a rare assemblage of spiritual graces united with the richest mental gifts. He read all useful books that he could procure, especially those on theological subjects, examining both sides of a question, studying views which to him were erroneous, and investigating the arguments of extreme infidelity. But the Bible he studied more than all other books. His intimate acquaintance with it is conspicuous in all his writings. Few men were less under the bias of education or of bigotry. He exerted all his powers to find out truth, searching for it as for hid treasure. Every valuable thought he pursued at once as far as he then could. He read pen in hand, not so much to take notes of other men's thoughts as to secure his own. His scholarship was remarkable for the day in which he lived and the opportunities which he enjoyed. Born in an obscure village of a new and thinly settled colony, with the forests around him, and separated by 3,000 m. of ocean from the seats of art, refinement, and knowledge; educated at a college (only three years older than himself) that offered advantages less than academies now supply, he passed all the rest of his years amidst the cares of a laborious profession, on the very frontiers (and some of those years in the heart) of savage life. Yet, with all these hindrances, he was a proficient in classic and Hebrew literature, physics, mathematics, history, chronology, mental philosophy, and ethics. His greatest work was written in four and a half months, during which he carried on the correspondence of the mission and preached, each Sabbath, two sermons in English, and two by interpreters to two Indian congregations, besides catechising the children of both tribes. His neglect of style as a writer is to be regretted. His works were printed very much as first written. Yet a marked improvement was effected in his later years. The style of the *Inquiry Concerning the Freedom of the Will* (written, as has just been said, in so short a time) is considered by competent judges to be as correct as that of most metaphysical treatises. 2. In the early part of his life he acquired a very high character as a minister and preacher. Most of his hearers felt and acknowledged his power. Long before the publication of his writings, his fame as a preacher had spread through the colonies and into Great Britain. To eloquence, as many use the word, he had indeed no claim. He exhibited no studied varieties of voice, no strong emphasis, no graceful gesticulation, no attempt at elegance of style or beauty of illustration. But if eloquence be the power of presenting important truth to an audience with overwhelming weight of argument, and with the whole soul of the speaker thrown into every part of the conception and of the delivery, so that the attention of all is riveted until the end, and impressions are made which cannot be effaced, then Jonathan Edwards has been justly pronounced one of the most eloquent preachers of his own or of any age. His solemn consciousness of the presence of God controlled his preparations, was manifest in his services, and had an irresistible effect on his congregations. His knowledge of the human heart, springing from knowledge of the word of God, skill in mental philosophy, and his own personal experience, enabled him to speak to the consciousness of his hearers. His theological learning was so complete, and his general information so extensive, that he could impart variety and richness of thought to his sermons, and bring illustrations to bear on every point. From first to last his aim was simply the salvation of his hearers and the glory of God. In the introduction to his sermon he explained the passage from which he was to preach, and with great skill presented its whole drift in all its bearings. In the body of the sermon he did not attempt an elaborate proof of his doctrine, but rather placed it before his hearers as a fact, and painted it to their imagination. He laid out his strength in the application, speaking to the consciences of his hearers, applying to different characters the important ideas of the sermon, and closing with a solemn and earnest appeal to every feeling and principle of human nature. He counseled, exhorted, warned, expostulated, as if he was determined not to stop without convincing and persuading

every man. 3. While his visits among his flock were, in a great degree, restricted to the sick and afflicted, he was eminently faithful and successful in other departments of pastoral work, especially in extraordinary labors during "revivals" which sprang up under his ministry, and in conversing with those who sought spiritual counsel. His study was at times thronged with persons who came to lay open to him their minds and hearts. 4. His theological treatises, especially, have made him extensively known, and are the foundation on which his highest reputation will ultimately rest. (1) In these he is distinguished for scriptural views of divine truth, adducing many passages in illustration and proof, examining them critically, arranging them carefully, and drawing conclusions from them with fidelity and skill. He seldom introduces any hypothesis of his own, and betrays little confidence in his own reason unless it is supported by the oracles of God. (2) He presents no partial or contracted views; all are simple, great, and sublime. His mind was too expanded to regard the minor distinctions of denominations and sects. He belonged to no church but the church of Christ, contented for nothing but the truth of God, and aimed supremely at holiness and salvation. His labors coincide so completely with those which the gospel prescribes, that no denomination can appropriate him exclusively to itself. His originality in argument is striking and continued. He never walks in a beaten path. His positions, arguments, and conclusions are his own; and he did much to render theology a *new science*. (3) In controversy he maintained an excellent spirit. His integrity and fairness were conspicuous. The idea of employing sophistry in his argument seems never to have occurred to him as a possible thing. He was kind and sincere; fair in stating the real point in debate; and candid towards his opponents. He carefully avoided personalities and the imputation of unworthy motives to those from whom he was compelled to differ. These excellences as a disputant appear the more remarkable when the circumstances in which he wrote, and the topics which he handled, are considered. The treatise on the affections was written in the heat of a violent controversy which divided and agitated the whole country. In his works on the will, original sin, and justification, he dealt with subjects which had aroused bitter opposition, and replied to persons who had boasted of their victories in vain-glorious and irritating terms. His book on qualifications for communion was composed in the midst of a furious parochial storm, which did not ruffle his temper, although it drove him from his parish and home. (4) While his manner was courteous and his temper undisturbed, his arguments were, for the most part, unanswerable. They derived their strength from the conclusiveness of his reasoning, the employment of different trains of proof, all converging to one result, the anticipation of objections which might be taken to his view, and the skill with which he brought the *reductio ad absurdum* to his aid. The most metaphysical of his writings—*On the Freedom of the Will*—has been described by high authority as "a book which never has been, and never will be, answered." His most practical treatise—*On The Qualifications for Communion*—being an attack on a favorite scheme of lax religionists, aroused indignation all over the country. Yet after a disastrous controversy it has so changed the opinions and practice of the New England ministers and churches, that a mode of admission to church-membership or to a *quasi* membership, then almost universal, is now disused. (5) In all his writings, even the most metaphysical, he aimed at the most important practical results. In them all his immediate success was great, and by them his influence on doctrine and piety has been extended through Christian schools of theology, pulpits, churches, and homes. Some of the themes on which he has given light are the following: God's end in creating this material and spiritual universe; the nature of his government over intelligent minds, and how it is consistent with their freedom; the nature of the virtue which they must possess in order to secure his approbation; the source, extent, and evidences of human depravity; the series of events by which redemption is effected; the qualifications for the church to which the redeemed belong; the grounds on which they are justified; the nature and evidences of the religion imparted to them by the spirit of grace; the distinguishing marks and effects of revivals of religion produced by the effusion of divine influence on men; the induction imparted to them by the spirit of grace, and the distinguishing marks and effects of revivals of religion produced by the effusion of divine influence on men.

EDWARDS, JONATHAN, the younger, second son of the preceding, was born at Northampton, Mass., May 26, 1745; studied the Indian languages at Stockbridge and among the Six Nations, in order to become a missionary; entered Princeton college and graduated 1765; studied theology under Dr. Bellamy; in 1767, became tutor at Princeton; from 1769-95 preached at White Haven (Fair Haven), Conn.; and from 1796-99 at Colebrook, Conn.; in 1799 was elected president of Union college at Schenectady, where he died Aug. 1, 1801. His chief work was *A Dissertation Concerning Liberty and Necessity*, an able exposition of his father's theory of the will. His complete works were edited by his grandson, Rev. Tryon Edwards (Andover, 1842).

EDWARDS, MATILDA BARBARA BETHAM (more commonly BETHAM-EDWARDS), was b. in Suffolk, England, in 1836. She took up the pen at an early age, her first effort in story-writing having been *The White House by the Sea*, which, like several of her later works, has been translated into various languages. Among her numerous novels and novelettes are *John and I*; *Kitty*; *Doctor Jacob*; *Bridget*; *The Sylvestres*; *Exchange no Robbery*; *Pearla*; *Love and Marriage*; *Disarmed*; *The Curb of Honor*; *A Romance of Dijon*; *The Romance of a French Personage*, etc. She has also published *A Year in Western France*, *A Winter with the Swallows in Algeria*, *France of To-Day*, etc., and, in 1885, a volume of *Poems*.

EDWARDS, PIERREPONT, 1750-1826; son of Jonathan, the theologian. He served in the revolutionary army; practiced law; and was a member of congress in 1787. He was U. S. district judge for Connecticut at the time of his death.

EDWARDS, TRYON, D.D., b. Conn., 1800; great-grandson of Jonathan, the theologian; graduated at Yale, studied theology at Princeton, and law in New York; settled in the ministry at Rochester, N. Y., in 1834, and afterwards at New London, Conn. Among his publications are *Christianity a Philosophy of Principles; Self-Cultivation*; etc. He has edited *Charity and its Fruits; Select Poetry for Children and Youth; Jewels for the Household; The World's Laconics; Wonders of the World*; and many issues of the *Family Christian Almanac*. He d. in 1894.

EDWARDS, WILLIAM, 1770-1851; b. N. J.; grandson of Jonathan. He introduced valuable improvement in the manufacture of leather, whereby tanning was accomplished in a quarter of the usual time. To be in proximity to abundance of hemlock bark, he set up a model tannery in the Catskill mountain region. His many improvements greatly advanced the production of leather in this country.

EDWIN, an English Saxon prince, was the son of Ella, king of Northumbria, who died about 589. He succeeded to the throne at the age of three years, but a neighboring potentate, Ethelfrith, invaded and conquered his territories, whereupon the infant E. was carried into North Wales, and was there educated. When he grew up to man's estate, Ethelfrith, fearing that his power would not be secure so long as E. lived, forced him from his asylum, and for many years he wandered about a disguised fugitive. Reaching East Anglia, he claimed the protection of king Redwald, which was readily granted. While residing there, Ethelfrith sent messengers to Redwald, requiring him to deliver E. into his hands, and threatening war in the event of a refusal. Redwald promised to accede to the request. A friend made known the resolve to the prince, and counseled flight; to this E. would not consent, but sat down without the palace, brooding over his misfortunes. While sitting there, Bede states that an unknown person approached him, and promised release from all his sufferings, if he would listen to what should be afterwards taught him. The apparition then placed its hand upon his head, and bidding him remember the interview and the sign, disappeared.

Redwald's queen pleaded the cause of E., and he finally determined to protect him. Raising an army, Redwald surprised Ethelfrith on the Idel, in Nottinghamshire, and defeated and slew him in 617. When E. regained his kingdom, he wooed Edelberga, daughter of Ethelbert of Kent. Her brother, who was a Christian, objected to her alliance with an idolater; but E. promised that he would not interfere with her religious belief. The princess became his wife; and Paulinus, who had been sent by Gregory to assist Augustine in his mission, accompanied her as her bishop.

About this time, E.'s life was attempted by an assassin, sent by the king of Wessex. He escaped with a slight wound, and on the same night the queen was delivered of a daughter. The king thanked his idols for the birth, but Paulinus directed his thankfulness to the Christian Saviour. The king promised to accept the new faith, if Heaven would grant him victory over the king of Wessex. His child and 11 of his household then received the rite of baptism. Raising an army, he defeated his foe, but delayed to fulfill his promise. Paulinus, having heard of the apparition which appeared to him while residing at the court of Redwald, one day entered the apartment in which E. sat, and placing his hand upon his head, asked him if he remembered the sign. The king was visibly affected, and at once assembled his witenagemote to deliberate on the matter of the new religion. Coifi, the high-priest, spoke first, and intimated his willingness to desert the idols, and embrace the Christian faith. A thane next rose and pronounced the beautiful speech which has been versified by so many poets, but which is most effective in the simple serious Saxon of the chroniclers. Coifi then headed the people in destroying the idol temple.

E. and the nobility of his kingdom were baptized in the eleventh year of his reign. Thereafter, he became the most powerful prince in England. He subdued a part of Wales, and his power extended northward to the Lothians. In 634, he fell in battle at Hatfield Chase, in Yorkshire; and in that disastrous fight, one of his children, and the greater portion of his army, perished. The history of this prince has been made the subject of a beautiful poem (*Edwin of Deira*, 1861) by Alexander Smith.

EDWY, EADWIG, or EDWIN (THE FAIR), about 938-58; king of the Anglo-Saxons; eldest son of Edmund I. He succeeded his uncle Eldred in 955. Little is known of his short reign except that he was at enmity with Dunstan, who bitterly opposed his marrying Elgiva. Dunstan was banished from the kingdom, but not long afterwards was restored by the Mercians, who had revolted from Edwy, and proclaimed Edgar king.

EECKHOUT, GERBRAND VAN DEN 1621-74; a painter, b. in Amsterdam; a pupil of Rembrandt, whose style he successfully imitated. As a portrait painter he had a peculiarly superior talent for expressing character. Among his best compositions are "Christ in the Temple," and "Haman and Mordecai."

EECLOO, a t. of Belgium, in the province of East Flanders, stands on the high-road between Ghent and Bruges, and is 12 m. n.w. from the former. It is clean and well built; and has manufactures of woolens, cottons, hats, tobacco, chocolate, soap, etc.;

also breweries, distilleries, vinegar-works, salt-refineries, dye-works, oil-mills, and a thriving trade in linen, cattle, and timber, as well as in grain, for which it has a large weekly market. Pop. '90, 11,642.

EEL, a name popularly given to all serpent-shaped or worm-shaped fishes, and sometimes extended to other animals of similar form, but otherwise extremely different, as the eels in paste, in vinegar, etc. The fishes to which this name is most commonly applied are *malacopterous* fishes destitute of ventral fins, and having the body covered by a soft thick slimy skin, the scales very minute, and often almost invisible, or entirely wanting. Most of them were included in the Linnæan genus *muraena*, and now constitute the family *muraenidæ*, divided by some naturalists into the families *synbranchidæ*, *muraenidæ*, *anguillidæ*, *congeridæ*, and *ophisuridæ*. All these have the skeleton destitute of ribs, and the fin-rays not jointed; whilst the *gymnotidæ*, including the electric eels (see GYMNOTUS), have ribs encompassing the belly, and the fin-rays jointed or branched. In all the eels, the gill-orifices are very small, and are situated far back, so that there is a long passage from the gill-chamber outwards; and hence, the gills not soon becoming dry, these fishes can remain out of water for a considerable time without injury, and some of them occasionally leave it of their own accord. The smallness of the gill-opening is also regarded as probably indicative of feebleness of respiration; and this, as in reptiles, is connected with extreme tenacity of life.—The *synbranchidæ* have the gill-passages so united under a common integument, as to present externally only a single orifice. They are almost destitute of fins. The species are few, and found only in tropical and sub-tropical seas.—The *muraenidæ* are also generally destitute of fins, or nearly so; they are all destitute of scales. They are all marine.—The *anguillidæ*, on the contrary, are fresh-water fishes, although some of them occasionally visit the sea. They have pretty large pectoral fins, anal and dorsal fins extending to and encompassing the tip of the tail, and numerous longish scales imbedded in groups in the skin, so as to resemble lattice-work. To these the congers (q.v.), although marine, are very nearly allied. The *ophisuridæ*, or snake-eels (q.v.), of the Mediterranean and other seas, are more widely different, and are easily distinguished by the tail ending in a conical finless point.

Until recently, all the British fresh-water eels were confounded together as of one species (*anguilla vulgaris*): Mr. Yarrell was the first accurately to distinguish them, and to show that there are at least three, if not four species, differing considerably in form, and in anatomical characters, as the number and form of the vertebræ, etc. Two of these seem to be very generally diffused, the SHARP-NOSED E. (*A. acutirostris* or *A. vulgaris*) and the BROAD-NOSED E. (*A. latirostris*). The difference in the form of the snout, which these names indicate, is very marked and obvious, and the general form of the sharp-nosed E. is also more slender.—The SNIG E. (*A. mediorostris*), found in some of the English rivers, is intermediate in the form of its snout, and is considered superior to the other kinds for the table. Its cervical vertebræ are destitute of the spinous processes which are found in both the other species. It is comparatively small. The sharp-nosed E. seems to attain the greatest size, sometimes almost 30 lbs. weight. It migrates on the approach of winter to the warmer brackish water of estuaries, often entering water which is perfectly salt; or if migration is impossible, it buries itself in mud. Eels are taken in great numbers during winter by means of *eel-spears*, or forks with several prongs, plunged into the mud. Sometimes they are dug out of the mud of river-banks, where large numbers are found congregated together. The eels which descend to estuaries or to the sea deposit their spawn there, and countless multitudes of young eels ascend rivers in spring. The passage of the young eels is called on the Thames the *eel-fare*, from a Saxon word signifying to pass or travel. So strong is the instinct which impels them, that they surmount obstacles apparently far more than sufficient to arrest their progress; they have been seen to ascend the large posts of flood-gates, “those which die, stick to the posts; others, which get a little higher, meet with the same fate, until at last a sufficient layer of them is formed to enable the rest to overcome the difficulty of the passage.” Young eels have also sometimes been met with in large numbers performing migrations on land among moist grass, generally in the evening or during the night; but the purpose of these migrations is not very well understood, nor are they known to take place with regularity.—Those eels which cannot migrate to the sea, breed in inland rivers and lakes.

Eels are very averse to cold, and to this is ascribed their winter descent to brackish water, or hiding of themselves in mud. The number of known species is large, but they all belong to the temperate and warmer regions of the globe. In these, also, the marine fishes to which the name E. is sometimes extended, chiefly abound.

There is a prejudice in some countries—particularly in Scotland—against eating eels, on account of their serpent-like appearance; but generally, as in England, they are highly esteemed. The London market is very largely supplied with eels from Holland; they are sent over alive in welled vessels.

There are various means beside those already noticed employed for the capture of the eel. Weirs and stages are erected across rivers, and baskets, or *bucks*, as they are termed, fixed in them for the taking of the eels during their migrations. These baskets are of large size, and shaped like a huge Chinese jar, in the mouth of which is fitted a

sort of funnel-shaped mouse-trap entrance, composed of flexible withy rods coming inwards to a point, and through which the eels can easily force their way, but when they turn about to find the entrance again, it is closed against them. When the eels are running, as it is termed—that is, during their migrations—many hundredweights are often taken in these basket-traps in a single night. *Eel-pots* are also used for their capture. These are of a similar nature to the bucks, but are smaller and more slender. They are sunk, by means of bricks tied to them, in the most likely runs or narrow spaces between weeds, or close to banks, and through which eels are likely to run. After a thunder-storm, eels always run well, as it disturbs them greatly. Eels are also caught by means of night-lines. These are long lines with heavy weights at each end, and in the middle if necessary, with hooks tied on every yard. These hooks are baited with pieces of dead fish, minnows, or worms. The line is sunk, and laid across stream—or, if fishing for conger-eels, in the sea—with, if it be thought necessary, a small buoy at one end, to recover the line by. These eel-lines should be hauled as early in the morning as possible, or the best eels will be found to have worked themselves off, leaving a mass of knots and slime behind them, to show where they have been. *Swinging* is a favorite amusement with some anglers. A rod or a long stick is provided, bent round at the slender end like the top of a very well used fishing-rod; on the point is fixed a single ring; through this ring is passed a piece of string; one end of this is held in the fisherman's hand. To the other end, on some fine but strong cord, is fastened a stout darning-needle, tied to the cord by the middle. The needle is then baited, or thrust lengthwise into a large lob-worm, until the fine cord alone comes out at the head of the worm. The worm is then drawn up to the ring of the rod. The fisherman then seeks for some hole in which he thinks an E. may be, and applying the point of the rod, pushes the worm into it. As soon as the fisherman believes an E. has swallowed the bait, he gives a slight pull to the string; and the needle, which has gone down the E.'s throat inside the worm perfectly straight, being tied by the middle, turns cross-wise in the E.'s throat or stomach, and hooks him. See *illus.*, *FISHES*, vol. VI.

EE'LEE, or **ILI**, a river of central Asia, rising in China and running w. about 600 m. to lake Balkash. The valley of the Eelee is the usual route between Russia and China.

EE'LEE, or **GOOLDJA**, a city in the extreme w. of China, in central Asia, on the river of the same name, 43° 46' n., and 82° 30' e.; pop. said to be 80,000. It is an important commercial center, and was formerly the place to which Chinese criminals were banished.

EEL-POUT, a name given in some parts of England to the burbot, and on some parts of the Scottish coast to the viviparous blenny.

EELS in paste, vinegar, etc., are animalcules (*infusoria*) of the family *vibrionidæ*. When at rest, they appear like very minute hairs, or bits of very fine thread. Some of them wind themselves about in a spiral form when they move. The species are numerous, and they occur in almost all vegetable substances beginning to corrupt and undergo decay, which they hasten. They are found also in decaying animal matter, and have recently been detected in diseased animal tissues; but the species found in such situations have not the elongated form which has given the name E. to those inhabiting paste a few days old, stale vinegar, etc., or occurring in diseased parts of living vegetables. Whether or not the origination of disease is to be ascribed to their presence in animal tissues, is not yet well ascertained; but in living vegetables this appears to be certainly the case, particularly in the disease of wheat called ear-cockles (q.v.).

EFAT. See **SHOA**, **ABYSSINIA**.

EFFARE, or **EFFRAYÉ** (Fr.), in heraldry, signifies that the animal to which it refers is to be represented as rearing on its hind-legs, as if it were frightened or enraged.

EFFECT. The general impression produced on the mind by the first sight of a picture or other work of art, or the impression which it produces when seen from so great a distance as to render the details invisible. The term has reference both to design and coloring, both of which, if correctly indicated, may be judged of with perfect confidence before either has been completed in detail. Bold sketches of their works are generally made by careful artists beforehand, for the purpose of adjusting the composition and coloring so as to produce the desired effect.

EFFENDI, a title of honor among the Turks, bestowed upon civil dignitaries and persons of various ranks, in contradistinction to the title of aga, borne by courtiers and military men. The word is equivalent to the English sir, or the French monsieur, and is frequently added to the name of an office. Thus, the sultan's first physician is termed *Hakim-effendi*; the priest in the seraglio, *Imam-effendi*; and the minister of foreign affairs was formerly called *Reis-effendi*.

EFFERVESCING DRAUGHTS. See **AERATED WATERS**.

EFFIGY (Lat. *effigies*), a likeness or representation either of the whole figure or of the head and face, as on a coin. See **BRASSES**. It is scarcely an artistic word.

EFFINGHAM, a co. in e. Georgia, separated from South Carolina by the Savannah river, and bounded w. by the Ogeechee; 449 sq.m.; pop. '90, 5599. The surface is level

and mostly covered with forests; productions, corn, cotton, and rice. Co. seat, Springfield.

EFFINGHAM, a co. in s.e. Illinois, on Little Wabash river; 490 sq.m.; pop. '90, 19,358. The surface is mostly prairie and the soil fertile. Co. seat, Effingham.

EFFLORESCENCE is the term applied to the appearance of a white incrustation on the walls of buildings, or when a salt loses its water of crystallization, and presents a white powdery appearance on the surface. Common washing-soda exposed to the air affords a good illustration of this phenomenon.

EFFRAYÉ. See **EFFARÉ**.

EFT, a term of Anglo-Saxon origin, applied both to lizards and newts, which—notwithstanding the important differences between them—were until recently confounded, even by naturalists. The Scotch word *ask* seems to be the exact equivalent of the English *eft*. In works of natural history, the term *eft* is now used as synonymous with newt (q.v.).

ÉGALITÉ, PHILIPPE. See **ORLÉANS, LOUIS PHILIPPE JOSEPH**.

EGAN, PATRICK, b. 1841, in co. Longford, Ireland. He became head of a wealthy business firm in Dublin. In 1868 he organized the Amnesty association for the release of the revolutionist prisoners of 1866–67; later became one of the council of the Home Rule league, and in 1880 was made treasurer of the Land league. Threatened, 1882, with prosecution under the Coercion Act, he left Ireland with the funds, placing them elsewhere for safety. In 1883 he became a resident of the U. S.; and was made president of the Irish National league, which succeeded to the Land league; and in 1889–93 he was U. S. minister to Chile.

EGAN, PIERCE, an English writer of Irish descent, whose *Life in London, or the Adventures of Tom and Jerry*, had great popularity in the first part of the present century. The book was illustrated by George Cruikshank, was one of Thackeray's early favorites, and furnished the hint for Dickens's *Pickwick Papers*; but its author has been strangely ignored by literary historians. His son, also named Pierce Egan, 1814–80, wrote nearly 30 novels, and was well known as the editor of several "penny-dreadful" papers in London. The elder Egan was b. about 1772; d. in 1849.

EGBERT, the most celebrated of the Anglo-Saxon kings before Alfred, was the son of Alcmund, who is said to have reigned in Kent, and was a descendant of the house of Cerdic. In 787, on the death of Cynewulf, king of Wessex, E. laid claim to the throne, but had to give way to another claimant, Brihtric, who was the more powerful of the two. E. was compelled to flee, and took refuge at the court of Charlemagne. Here he remained for 13 years, until, in 800, on the death of Brihtric, he was summoned to England to fill the throne of Wessex. England was at this time divided into three great sovereignties: Northumbria, extending over what were occasionally the separate kingdoms of Deira and Bernicia; Mercia, which had now subjugated the petty powers of Kent, Essex, and East Anglia; and Wessex, which had absorbed Sussex. For the first nine years of his reign, E. drew no sword. His mild government completed the attachment of his subjects, and the peace which he maintained fostered his strength. In 809, however, he marched against the Britons of the west, and after fighting five years in Cornwall and Devon, he succeeded in subduing the wild tribes to at least a temporary subjection. In 823, the most important event in his career took place. At that time a dispute had arisen between the East Angles and their Mercian conquerors, and the former sent ambassadors to E. imploring aid and protection. E. joined the East Angles with an army which, according to the old chroniclers, had a peculiarly fighting appearance, being "lean, meager, pale, and long-breathed." The encounter between the Mercians and the East Angles with their ally took place at Ellandūn (the modern Wilton, according to some), where a furious battle was fought, in which the Mercians were defeated with great slaughter. By this battle the power of Mercia was broken, and Essex and Kent, formerly Mercian provinces, became incorporated with Wessex. For four years after the great battle of Ellandūn, Mercia remained the seat of discontent and strife, and E., in 827, taking advantage of his opportunity, led thither an invading force, and reduced the country to a state of vassalage. Turning next his arms against Northumbria, he compelled that sovereignty also to acknowledge his supremacy (827–828). He afterwards penetrated into Wales, where, in like manner, success attended his arms.

E., now virtually king of England, though both he and his successors until the time of Alfred were in the habit of designating themselves only kings of Wessex, found it necessary, after a few years' comparatively peaceful rule, to direct his attention to a new and foreign enemy. The Danes, who had been making frequent descents upon the island since 832, and who in that year had defeated the forces of E., reappeared in 835 on the coast of Cornwall, where they were joined by numbers of the Cornish Britons. E., however, at the head of his West Saxons, met them at Hengestes-dūn (Hengstone), and in a great battle completely overthrew them. In the following year, he died, after a reign of 37 years.

EGEDE, HANS, was b. in Senjen, in Norway, Jan. 31, 1686, studied in Copenhagen, and was appointed to the church of Vaagen in Norway in 1707. Having determined to proceed to Greenland to convert the natives, he resigned his *cure* at the end

of ten years; and, after devoting himself with assiduity to the study of the language, embarked for Greenland, with his wife and sons, in 1721. He remained 15 years in Greenland, during which time he labored zealously among the people, and by his preaching and teaching secured a permanent footing there for the Christian mission, which owed its origin to him. On his return to Copenhagen, he employed himself in instructing missionaries in the dialects of Greenland; and in 1740 he was made a bishop. He died in 1758. He has described the course and success of his labors in *Det gamle Grønland's nye Perlestrøtion* (Copenh. 1729 and 1741). He was ably seconded in his labors by his wife and his sons, Povel and Niels.—POVEL (or PAUL) EGEDE, 1708–89, who was his father's successor, and was also a bishop, translated the gospels and several devotional works into the Greenland language, and compiled a grammar and dictionary for the use of the Greenland mission; the latter appeared in 1750 under the title *Dictionarium Grønlandico-danico-latīnum*.

EGER, a t. and river of Austria, in the province of Bohemia.—1. The town E. stands on a rock on the right bank of the stream of the same name, is 90 m. w. of Prague, and near the Bohemian frontier. Formerly, it was a border fortress of some importance; its walls, however, have been almost entirely pulled down, and its fosses filled up with rubbish. Among the conspicuous edifices of E. are its churches, of which there are four—one of them, the deanery church, very handsome; the market-place, within which is the large town-hall; two monasteries, a Dominican and a Franciscan; and the barracks. East of the market-place is the house of the burgomaster, in which Wallenstein was assassinated in 1634. The ruins of the imperial burg or citadel, formerly the residence of kings and emperors, is situated in an angle of the fortifications above the river. From the midst of these ruins rises a singular square black tower, constructed of masses of volcanic tufa. The double chapel, consisting of two stories, the upper supported by graceful marble pillars, is a fine specimen of Gothic architecture. An avenue, nearly three m. long, leads from E. to Franzensbrunn (q. v.) E. has manufactures of broad-cloth, kerseymeres, cottons, chintz, leather, soap, etc. Its industry and commerce have greatly increased since it became a point of junction of five railways. Pop. '90, 18,458.—2. The river E. rises 12 m. n.w. of the t. of E., flows first s.e. to E., then advances in a general n.e. direction, passing Elbogen, Saaz, Birdin, and Theresienstadt, near which town it joins the Elbe, after a course of about 120 miles. Its current is rapid, and no part of its course is navigable.

EGE'RIA was the name of the Nymph or Camena, from whom, according to the legend, king Numa received the ritual of public worship which he established in Rome. The grove where Numa met the goddess to receive her instructions was dedicated by him to the Camenæ. Roman legends speak of two groves dedicated to E.—one near Aricia, the other before the Porta Capena at Rome, where the grotto of E. is still shown.

EGERTON, FRANCIS. See BRIDGEWATER.

EGG, Ovum. In a great majority of the different kinds of animals, reproduction takes place by means of eggs; in other words, the animals are *oviparous*. It is only in the *mammalia* that we find animals truly *viviparous*; whilst the *marsupial* quadrupeds and the *monotremata* form connecting links, in this part of their natural history, between the *mammalia* which are *viviparous* in the fullest sense of the term, and the warm-blooded animals (birds) which are *oviparous*.

To the articles REPRODUCTION and DEVELOPMENT OF THE EMBRYO, we must refer for an exhibition of the differences between *oviparous* and *viviparous* reproduction, and of that original and essential agreement in important particulars, which has been strongly asserted in the saying, *Omne animal ex ovo* (Every animal is produced from an egg). To the article DEVELOPMENT OF THE EMBRYO also reference must be made for what may be called the *history* of the E., and the development and uses of its several parts.

The number of eggs varies extremely in different animals, some birds producing only one at a time, or in a year, others twenty or nearly so, whilst the roe of the herring, cod, and many other fishes, contains myriads of eggs. The eggs of some animals are enveloped in a gelatinous mass; those of some are joined together, and are laid in a kind of string; those of others are connected together in various ways. For notice of such peculiarities, we must refer to the articles on different classes of animals.

The economical uses of eggs are well known. The eggs chiefly used are those of birds, although the eggs of turtles are also in great repute as an article of food and luxury, and those of fresh-water tortoises are valued for the oil which they yield. The birds' eggs chiefly used for food are those of the species commonly domesticated as poultry, and others allied to them—gallinaceous birds and web-footed birds. Of gallinaceous birds, the common domestic fowl, the turkey, the peahen, and the guinea-fowl, produce the eggs most generally used and brought to market in different parts of the world; of web-footed birds, the common duck is in this respect the most important, although the eggs of other *anatidæ* are also used for food, and those of some of the other web-footed marine-birds are much sought after by the inhabitants of the wild and rocky shores which they frequent. Thus, the eggs of gulls and guillemots afford an important article of food to the people of St. Kilda, and of some of the Orkney and Shetland

islands, as well as to the inhabitants of Iceland and other far northern regions. It is in quest of eggs, as well as of young birds, that the dangers of the most tremendous precipices are braved by men whom their companions let down by ropes, and who gather the eggs from the rock ledges. The coasts of Labrador are also visited by *egggers*, who collect the eggs of sea-birds, and carry them for sale to some of the American ports. The eggs of some of the sea-birds of the West Indies are of considerable commercial importance. See EGG-BIRD.

EGG, AUGUSTUS LEOPOLD, 1816-63; b. London; painter and member of the royal academy. He was a well-trained and talented painter of *genre*, chiefly of compositions from poets and novelists. At the time of his death he might be ranked among our best painters in his special class, but he had no marked originality of style. Among his works are "Queen Elizabeth Discovers She is no Longer Young;" "Peter the Great Sees Catherine for the First Time;" "Charles I. Raising the Standard at Nottingham;" "The Night Before Naseby;" and the dinner scene from the *Taming of the Shrew*.

EGG, CHEMISTRY OF. An ordinary good-sized hen's egg weighs about 1000 grains, of which the white constitutes 600 grains, the yolk 300, and the shell 100. The white or glaire of the E. is a strong solution of albumen (q.v.) in water, and whilst readily miscible with water in its ordinary state, it becomes insoluble when subjected to heat, as in boiling an egg. In 100 parts, the white or glaire of E. consists of—water, 80; dry albumen, $15\frac{1}{2}$; salts, etc., $4\frac{1}{2}$. The yolk or yelk of the egg is composed of a strong solution of albumen, through which multitudes of minute globules of oil are suspended, which render it essentially an emulsion. In 100 parts, it consists of—water, $53\frac{1}{2}$; dry albumen, $17\frac{1}{2}$; oil (with small proportion of salts), $28\frac{1}{2}$.

EGG, or EIGG, an island 12 m. off the w. coast of Inverness-shire, and 8 m. s.w. of the s. point of Skye. Its length is about $6\frac{1}{2}$ miles. It consists chiefly of trap, which in the n. alternates with sandstone and limestone, the latter rocks containing oolitic fossils, carbonized wood, and coal. The scuir of Egg, in the s.w., rises 1339 feet. The upper 470 ft. of this hill is a mass or vein of pitchstone, $1\frac{1}{2}$ m. long, and 100 ft. broad. Some of the pitchstone forms straight, inclined, or curved columns, from a few inches to nearly two feet in diameter. In one place, the pitchstone overlies red sandstone, conglomerate, trap, and the silicified wood of an oolitic pine. In the s. part of the isle is a large cave, entered by a narrow opening, through which only one person can creep at a time. Here it is traditionally related that the laird of Macleod, to revenge an injury done to some of his clan, smoked to death all of the inhabitants (200 Macdonalds) of the isle, who had hid themselves in the cave.

EGG, MUNDANE. See MUNDANE EGG.

EGGA, a large t. of western Africa, is situated on the right bank of the Niger, in lat. $8^{\circ} 43'$ n., long. $6^{\circ} 20'$ e. It is one of the trading stations of the Royal Niger Company. Its streets are narrow; the houses are principally huts built of clay, the walls smooth, and stained with indigo. Great quantities of narrow cotton cloth, only a few inches in breadth, and generally dyed blue, are manufactured here. The inhabitants are enterprising and commercial; many of them possess canoes, in which they trade up and down the Niger. The chief articles of trade are beautifully carved calabashes, cloth net-work, corn, yams, sweet potatoes, dried fish, and a few European articles, as beads and gunpowder. The population, which is said to be 8000, is partly Mohammedan and partly pagan.

EGGAR MOTH, the name of certain species of moth, of the genus *lasiocampa*, allied to the silk-worm moths. One species (*L. trifolii*), of a uniform foxy ochreous color, with wings expanding about 2 in., produces a caterpillar as thick as a swan's quill, hairy, and ochreous brown, which feeds sometimes on broom, but frequently in clover-fields.

EGG-BIRD, *Hydrochelidon fuliginosum* or *sterna fuliginosa*, a bird of the gull family, sometimes called the SOOTY TERN. It is fully larger than the common tern of the British shores; has a long, slender, nearly straight, compressed, sharp bill; very long, narrow, and pointed wings, and a long deeply forked tail: the general color is glossy black on the upper parts, except the forehead and the edges of the wings, which, with the under parts, are white. It abounds in the West Indian seas, and is to be seen in myriads on and near some of the *keys* or low barren islets where it breeds. When visitors land on these keys, the disturbed birds rise and fly about in clouds which darken the air, whilst their turmoil overpowers even the roar of the breakers. The nest of the egg-bird is merely a little excavation in the sand, and usually contains three eggs, which are fully 2 in. long, of a pale-cream color, sparingly marked with light-brown and purple tints.

EGGLESTON, EDWARD, D.D., b. Vevay, Indiana, 1837; became a Methodist minister and subsequently pastor of a church in Lee Avenue, Brooklyn, N. Y., which professed no sectarian creed. He has written many successful novels, dealing with life among the early settlers of Indiana: *The Hoosier Schoolmaster*, 1871; *The End of the World*, 1872; *Mystery of Metropolisville*, 1873; *The Circuit Rider*, 1874; *Roxy*, 1878; and has also published biographies, juveniles, etc., besides several interesting and valuable serial papers, historical or descriptive; *A Household History of the United States* (1888); *The Faith-Doctor* (1891); *Duffels* (1893); *Stories of Great Americans* (1895); *The Beginners of a Nation* (vol. 1, 1897), etc.

EGGLESTON, GEORGE CARY, b. Vevay, Ind., 1839; bro. of Edward. He was educated at Indiana Ashbury univ. and at Richmond college, Va.; studied law, but abandoned that profession for literature. He was for some years editor of *Hearth and Home*, and literary editor of the *Evening Post*; and has published *How to Educate Yourself*; *A Man of Honor*; *A Rebel's Recollections*; *American War Ballads and Lyrics* (1895); *American War Ballads and Lyrics* (1897), etc.

EGG-PLANT, *solanum melongena*, an annual usually less than 2 ft. high, with stem partially woody; fruit very much resembling an egg in appearance, and varying in size from that of a hen's egg to that of a swan's egg, in color generally white, yellow, or violet. The fruit is much used as food, not only in the East Indies, of which the plant is a native, but in warm countries generally. The fruit is known by various names—as egg-apple, auberjine, brinjal, etc.

EGGS, EASTER. See EASTER.

EGGSHELL CHINA, a very thin and translucent variety of china, originally made in China, but now produced in European factories. A mold of plaster of Paris is filled with barbotine. A thin film of this material at once adheres to the mold, owing to the absorption of its moisture by the gypsum. The liquid barbotine being then thrown out, the mold, with the film adhering to it, is put into the kiln. On removing from the kiln, the baked film can readily be separated from the mold.

EGHAM, a village in the n.w. of Surrey, on the left bank of the Thames, 18 m. w. of London. In the vicinity is Runnymede, a meadow on the Thames, where king John conferred with his barons before signing the Magna Charta in 1215. Near also is Cooper's Hill, rendered famous by Denham and Pope.

EGINHARD, or EINHARD, the biographer of Charlemagne, was b. towards the end of the reign of Pepin, or the beginning of that of Charlemagne. At an early age, he repaired to the court of the latter monarch, and became a pupil of Alcuin. His talents and acquirements gained him the favor of the emperor, who appointed him his private secretary, and superintendent of public buildings. E. accompanied the emperor in all his marches and journeys, never separating from him except on one occasion, when he was dispatched by Charlemagne on a mission to pope Leo. On the death of the emperor, he was appointed preceptor to Lothaire, son of Louis le Débonnaire, and for a number of years afterwards appears to have been lay abbot of various monasteries; but ultimately becoming tired of secular life, he retired to the secluded town of Mühlheim. Here he erected a monastery, and changed the name of the place from Mühlheim to Seligenstadt (City of the Blessed). He is said to have now become a monk, but this is scarcely authenticated. E. died 14th Mar., 840, and was buried beside his wife, who died in 836. The two coffins are now shown in the chapel of the castle at Erbach. The counts of Erbach trace their descent from Eginhard. His *Vita Caroli Magni*, completed about the year 820, with respect to plan and execution, as well as language and style, is incontestably the most important historical work of a biographical character that has come down to us from the middle ages. It was frequently used as a school-book, and was therefore copied *ad infinitum*. The best German edition is that of Pertz, in the *Monumenta Germaniæ Historica*. His *Epistolæ*, 62 in number, are also of considerable value in a historical point of view. The French consider the edition of E.'s works by M. Teulet, with a translation, and life of E. (1848), to be the best and most complete. E.'s second work, the *Annales Regum Francorum*, *Pippini*, *Caroli Magni*, *Hludowici Imperatoris*, embraces the period from 741 to 829. According to a pretty legend, E.'s wife, Emma, was a daughter of Charlemagne. A mutual affection had arisen between them, and on one occasion when the lovers were enjoying a nightly interview, a sudden fall of snow covered the spacious court, thus rendering retreat impossible without leading to a discovery. As the traces of female footsteps could not excite suspicion, Emma carried her lover across the court on her shoulders. This scene, it is said, was observed from a window by Charlemagne, who united the affectionate pair in marriage. On this legend Fouqué founded his romance of *Eginhard and Emma*, and Longfellow has made it the subject of a short poem.

EG'LANTINE, a name sometimes given to the sweet brier (*rosa rubiginosa*), but also sometimes to other of the smaller-flowered species of rose.

EGLINTON and WINTON, ARCHIBALD WILLIAM MONTGOMERIE, Earl of, K.T., twice lord-lieutenant of Ireland, was b. at Palermo, in 1812. He was a well known patron of the turf and field-sports, and his name is particularly associated with a splendid revival of the mediæval tournament, which he gave at Eglinton castle in 1839 (see *TOURNAMENT*). Lord E., who was at various times lord-lieutenant and sheriff-principal of Ayrshire, lord-rector and dean of the faculty of Glasgow university, etc., died in 1861.

EGMONT is the name of the principal harbor of the Falkland isles, and of an active volcano in New Zealand, besides several other unimportant places.—1. Port E. is on the n. coast of the more westerly of the principal two islands of the group, its seaward barriers being the islets of Keppel and Saunders. It is in lat. 51° 21' s., and long. 60° w. The anchorage is good; and the shores afford fresh water, but are almost destitute of wood.—2. Mount E. is on the northerly island of its own group, rising 8,270 ft. above the sea. It is 18 m. s. of New Plymouth, in lat. 39° 15' s., long. 174° 13' east.

EGMONT, LAMORAL, Count, PRINCE OF GAVRE, was b. in the castle of La Hamaide, in Hainault, in 1522; and inherited his property and titles from his elder brother Charles. He accompanied Charles V. on his expedition against Algiers in 1541, and followed that monarch afterwards in all his campaigns, but without distinguishing himself greatly. After the accession of Philip to the throne, E. commanded, with great success, the cavalry, in the battle of St. Quentin, 1557, and next year in that of Gravelines; and when Philip finally returned to Spain, he left E. governor of Flanders and Artois. In this position, E. entered into alliance with the party in the Netherlands that were dissatisfied with the Catholic policy of Philip, and from a courtier became all at once a man of the people. His proud, imperious character, however, and his subsequent conduct, have induced many to suppose that, like his bosom-friend, the prince of Orange, he was less actuated in this by high motives than by self-interest, or at least by disappointed ambition. The more common opinion, however, is, that he was a humane and virtuous patriot, who, although indifferent to Protestantism as a religion, was anxious to do justice to all the members of that oppressed faith. When Margaret, duchess of Parma, against the will of the Protestant party, was made regent-general of the Netherlands, E. and the prince of Orange entered the council of state, and held the command of the few Spanish troops. At first he sided with the party who were discontented with the infringement of the liberties of the provinces, and the introduction of the inquisition; but when insurrection broke out, he at last broke with the prince of Orange and the "Beggars' league," as it was called. He seemed to have restored order, and to be maintaining it, when, in April, 1567, the duke of Alba was sent as lieut. gen. to the Netherlands. The prince of Orange and other chiefs of the insurrection left the country; E. wishing to save his private property, remained, thinking his return to the court had secured his safety. When Alba entered Brussels, 22d Aug., E. went to meet him, and sought to secure his favor by presents. He appeared to have gained his confidence, when suddenly, after a sitting of the council, he and count Hoorn were treacherously seized, and carried to the citadel of Ghent. The states of Brabant sought to withdraw E. from the bloody tribunal, as it was called, instituted by Alba, and E., as a knight of the Golden Fleece, denied its competency. But all in vain. He was called upon to justify himself against 90 counts of accusation; and as he persisted in protesting against the incompetency of the court, and thus left many of the points unanswered, he was held guilty of contumacy, and along with count Hoorn condemned to death. On the following day, June 4, 1568, they were both beheaded in the market-place of Brussels. Although E. hoped for pardon to the last, and intercession was made for him from the highest quarters, he died with the greatest composure. It is related that as he received the fatal stroke, Johanna Lamil, who had been his mistress, fell down dead, and the people, in a paroxysm of sympathy, dipped handkerchiefs in the blood that seemed shed in martyrdom to freedom. E. left 11 legitimate children, of whom 3 were sons. The whole of his property, movable and immovable, was confiscated with the greatest rigor. See *Correspondance de Marguerite d'Autriche, Duchesse de Parma* (Bruss. 1842), and *Correspondance de Philippe II. sur les Affaires des Pays-Bas* (Bruss. 1848-51, 2 vols.). Goethe has made the death of E. the subject of a tragedy.

EGOISM (from Lat. *Ego*, I), in philosophy, is the theory that self-existence is the only certainty. This theory is supposed to have been held by a certain sect of the followers of Descartes (q.v.). Reid (*Intellectual Powers*, Essay II, chap. 8) says that some of Descartes' followers, who doubted everything save their own existence and the existence of the operations and ideas of their own minds, remained at this stage of his system and so obtained the name of egoists. Hamilton in a note on this passage expresses his doubts about the existence of this sect of egoists. Stewart (*Dissertation*, pt. I, chap. 11) says that the name of egoists was applied to those followers of Descartes who maintained that no man can have full assurance of anything but his own individual existence. Stewart and others hold that such egoism is the logical consequence of Berkeley's philosophy. As a term of ethics, egoism denotes the habit of doing things which tend directly or indirectly to one's own advantage to the neglect of those things which benefit others. In such a system, the advantage of the *Ego*, or individual's own self, is the standard of action. Sidgwick, *Methods of Ethics*, p. 109, says, "By egoism we must mean the system that fixes as the reasonable ultimate end of each individual's actions his own greatest happiness: i.e., a life so arranged that the excess in it of pleasurable over painful consciousness shall be the greatest possible." See further, Sidgwick, op. cit., book II., and Spencer's *Data of Ethics*, chap. XI-XIV. See also ALTRUISM.

EGRET, a name often given to various species of heron (q.v.), particularly those which, at least during the breeding season, have the feathers on the lower part of the back lengthened and their barbs loose, so that this part of the plumage is very soft and flowing. Most of the egrets have beautiful white plumage. The distinction between egrets and other herons is not, however, very strongly marked, and the names are often used indiscriminately, although the name E. is never given to the common heron. E. plumes are used for ornamental purposes, particularly the occipital crest and scapulars of the LITTLE E. (*ardea garzetta*); and the name E. (Fr. *aigrette*) has become a common term for a tuft of feathers, although it is said to be derived from the French *aigre*, harsh.

on account of the harshness of the voice of the bird. In old English bills of fare, egrets are mentioned as if they were abundant; and not fewer than 1000 "egrittes" are included in the bill of fare of a single great feast, given at the enthronization of George Neville, archbishop of York, in the reign of Edward IV.; but as there is no other evidence that any species of *E.* was ever otherwise than of very rare occurrence in Britain, great probability seems to attach to the opinion originally advanced by Dr. Fleming, that perhaps the lapwing might be meant, "the most common bird with a crest."

EGYPT, a country in northeast Africa, extending from the Mediterranean to the first cataract of the Nile at Syene, from lat. $24^{\circ} 6'$ to $31^{\circ} 36'$ north. The Greek name, Egypt, found already in Homer as *Aigyptos*, has not as yet been explained sufficiently. The national name was Kemi(t), "black country," from the color of the fertile soil (derivatives: *chemistry*, *alchemy*, i.e. "Egyptian science"). The Semitic name *Masr* (Assyrian, *Musru*; Hebrew, *Misraim*) seems to point to its fortified frontiers. The country is nothing but the bed of the Nile amidst the Libyan desert, the cultivated soil extending only to the limits of inundation, inclosed between the hills of the (western) Libyan side and the mountains of the (eastern) Arabian, which at some distance eastwards rise to an altitude of about 1000 ft. above the level of the sea. The Delta, beginning at Cairo (lat. $30^{\circ} 15'$ north), where the Nile divides itself into two great branches (those of Rosetta and Damietta) and several small canals which formerly were branches of equal importance (7 branches in the Greek period), has been gained from the sea by the mud deposits of the Nile during some millenia. The cultivable soil in the narrow valley covers only about the space of Belgium. Good administrations increase it, constructing means of irrigation; neglect of the canals reduces it, for the absence of rain makes the cultivation depend wholly upon the yearly inundations. These, which are caused by the tropical spring rains in the interior of Africa, reach Egypt in June and continue until October. In November, the inundated fields are dry enough to be sown.

Geology.—Between Egypt and Nubia is a chain of granite rocks, interrupting the course of the Nile by cliffs and forming the cataracts of Assuan (Syene). The two ranges of hills on the two sides of the Nile valley (the Arabian and Libyan side) consist in the main of cretaceous sandstone, but from Esneh, of limestone. The eastern desert rises to elevations of 6000 feet; the rocks consist of granite, basalt, porphyry, and breccia. All these stones were used for the buildings and sculptures of the ancient inhabitants, the quarries of Syene especially furnishing the best material for obelisks, etc. The western desert is nearly unbroken, though some valleys contain oases. The Delta consists entirely of alluvium of the Nile, argillaceous earth mixed with sand. Back of the sand hills which form the coast are salt marshes and marshy lakes.

Climate.—The climate of Egypt is very warm, but healthful in the upper parts, owing to the dry air from the desert; and consumptive persons are often benefited by spending the winter in Egypt. Perfect acclimation, however, is difficult for Europeans. The disregard of sanitary rules makes the native population frequently a prey to plague and cholera, though these are now somewhat diminished, since the sanitary measures of the government have been perfected. Dysentery and ophthalmia are common.

Flora.—The flora, formerly quite tropical, is now not very different from that of southern Europe. Its most characteristic features are the absence of any wild vegetation, especially of woods. The few trees are date and doom-palms, sycamores, tamarisks, acacias, mulberry-trees. The chief field-products are wheat, sugar-cane, tobacco, indigo, and lately cotton. Durra is the only African element among them. Of the two famous water-plants cultivated in antiquity, the papyrus has disappeared, and the lotus has become rare.

Animals.—Similarly the animals have lost all African character, and the hippopotamus and crocodile have retreated to Nubia. The domestic animals now include the one-humped camel introduced after the Christian era. The common riding-animal is the strong Egyptian ass. Buffaloes and sheep are the common herd-animals. Tame birds (many pigeons) and wild water fowls (ibis, egret, pelican, etc.) are abundant. Among the numerous reptiles, the asp and the cerastes are dangerous. The Nile contains many fish, of which the binnee (*cyprinus bynni*), the bultee (*labrus niloticus*), the *oxyrinchus* of the Greeks, and the silurus (*bayad*) are most remarkable. The insect-plague is great, especially of scorpions and locusts. The sacred scarabæus-beetle is still frequent.

Stones of Egypt.—See above. Alabaster is found in Middle Egypt. The mines around Egypt, as well as the ancient gold mines of Nubia, are not very productive.

History.—All historical books written in hieroglyphics have been lost. Their existence is proved only by fragments of a short extract on papyrus preserved in Turin. Manetho, a priest of Sebennytus, under Ptolemy Philadelphus (3d century B.C.), wrote an Egyptian history in three books, which has also been lost. Epitomes of great inaccuracy are preserved in the works of Josephus, Julius Africanus (300 A.D.), Eusebius, and George Syncellus. Herodotus gives some good material; Diodorus and Eratosthenes are far less reliable. The inscriptions are now the greatest aid, but are not always satisfactory. The worst difficulty is the total absence of a reliable system of chronology. The Egyptians themselves had no era, but dated after the years of every king; and the loss of all historic works prevents our connecting each reign with its predecessor. In

the scanty extracts from Manetho's history, the chronological numbers are mostly corrupted. Thus the different systems of modern scholars lack any solid foundation and date—for instance, king Menes, 5702 B.C. (Boeckh), 5613 (Unger), 5004 (Mariette), 4400 (Brugsch), 3892 (Lepsius), 3623 (Bunsen), 200 (Sharpe). At the present time, scholars refrain from these attempts, and only give approximate dates, or "minimal dates," showing before which year a king *must* have reigned, and leaving it doubtful whether he lived 100 or 1000 years before. Up to the present time, no date before the 8th century has been fixed with absolute certainty. The approximate estimation is uncertain after 1600, even as to the century to which a king can be attributed. Manetho's division of the whole history up to 342 B.C. into 30 dynasties or groups (not families) of kings has been confirmed in general. Dyn. 1-6 form the Ancient Empire; 11-14 the Middle Empire; while with Dyn. 17 begins the New Empire.

Egypt was a civilized state, it seems, at as early a date as Babylonia. Its civilization may have been derived from that earliest habitation of mankind, but before the year 3000 its development had led to perfect independence and had reached a higher degree even than that of Babylonia. The earliest history is, however, obscure. The later priests filled many thousands of years with the mythical reigns of the different gods, after which they placed 4000 or 1300 years of the demigods or *manes*, i.e. prehistoric kings, whose names had been lost. The first historical king is Menes (*Mni*) from Thinis, probably the first ruler uniting both parts of Egypt. Before him it was divided into the Delta and the Southern Land, and the royal titles distinguish "both countries" even in the latest periods. (Note the Hebrew name, *Mizraim*, "the two Egypts.") He is said to have had his residence near Memphis, where he turned aside a branch of the Nile, and was slain by a hippopotamus. Similar anecdotes given by Manetho are all we know about the first three dynasties; and such remarks as: "Menes' son Athothis wrote a medical book," "Sesonchis was a very tall man," "Under Nefercheres, the Nile flowed eleven days with honey," etc., are apparently non-Manethonian and later additions. Complete lists of their names have been found on later monuments. Of the fourth dynasty we have authentic monuments enough, because its powerful kings were great builders and in their time it became the custom to construct large tombs. The first king, Snefru, conquered the peninsula of Sinai, where he opened the copper mines at Wadi Maghara. His two successors, Khufu (Cheops) and Khafre (Chephren), built the two greatest pyramids, the grandest works of Egyptian architecture. The great sphinx near their pyramids, in which some scholars have seen the most ancient monument of Egypt, was considered a work of Chephren according to later tradition. Other kings were Dadefrê, Menke(rv)rê or Mykerinus, the builder of the third great pyramid, Shepseshaif. All monuments of that period (the end of fourth millennium), the wonderful statues of Chephren, found in a pit at Gizeh, and the finely sculptured tombs of the high officials, buried around the pyramids, show a perfection of the national art never reached afterwards. The fifth dynasty (12 kings) has left less remarkable monuments; but a private tomb, that of *Ty* in Sakkara, is the largest of its kind. The last king, Onnos of Manetho, introduced the custom of covering the funeral chamber of his pyramid with inscriptions. This example, followed in the sixth dynasty by *Ti* (read *Atofi* ?), Ppy I. (Apopy ?), Mernrê, Ppy II., and Neferkrê, has furnished us the many texts of their pyramids opened in 1880,—magic formulæ of no historic, but of great religious and linguistic interest, being copies of books so ancient that they were partially unintelligible to the scribes of that remote age. Ppy I. has left traces of his constructions in all parts of Egypt, and waged a great war against the tribes of the Sinaitic desert and in Palestine, for which he used negro troops from Nubia (Nubia being already tributary) in great numbers. Most kings of this period had built their residences, every king built a new city—around Memphis. Ppy founded the city of Memphis, famous afterwards, which received its name from his pyramid *Mennofer*. Ppy II. reigned over 90 years. Whether Queen Nitrocris, whom Manetho names as the last member of the sixth dynasty, and of whom he and Herodotus relate interesting stories, is a historical person, is very doubtful.

Dynasties 7 to 11, especially 7-9, form a very obscure period which has left monuments of only few kings out of some dozens. The reason is that, after dynasty 6, the princes of the *nomes* (counties) became more and more independent, and the power of the king consequently decreased. Dynasties 7 and 8 were of Memphitic origin, 9 and 10 of Heracleopolitan. The tombs of Siat (published recently by Griffith) show us that the kings in Heracleopolis had to fight continually against rebellious nomarchs (counts), especially against those of Thebes. These had made themselves independent very early, and in dynasty 10 began to claim even the royal title. They (dyn. 11) succeeded in conquering the whole country in a long struggle, and the last six kings of this family, the members of which had nearly all the names *Antef* or *Mentuhotp*, ruled over the reunited kingdom. They first made Thebes, formerly an insignificant provincial town, the capital. One of them, *Sankhkere*, sent the first expedition of which we know to *Punt* (see below). The greatness of Thebes dates still more from the succession of the twelfth Theban dynasty, beginning, probably, about B.C. 2500. The first king, *Amenemhêt I.*, strengthened the royal power by subjecting the rebellious nomarchs so far that the new dynasty was able to inaugurate a period of high political and intellectual strength, of peace and wealth. This period seemed to the later Egyptians the golden age,

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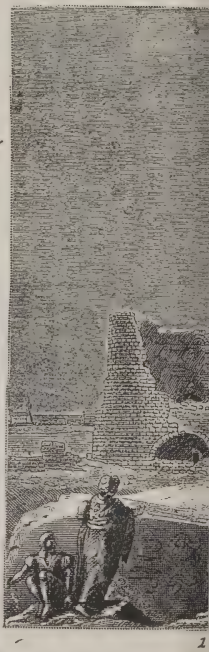
especially of literature, whose poetical style formed the model for all periods. It does not seem that the twelfth dynasty possessed more of Asia than the copper mines near Mount Sinai; but it conquered Nubia, the land *Koshi* (the biblical *Kush*), up to the second cataract and beyond it. Usertesen II. built there (at Semne) two strong fortresses on both sides of the Nile, and a tablet announces that no negro was allowed to pass this frontier from the south. The Pharaohs began to explore systematically the gold mines of that country, and kept this province for centuries under many struggles. The internal works of dynasty 12 are very numerous; many cities, especially Thebes and Heliopolis (*On*), besides also those of the eastern Delta (Tanis, Bubastis, etc.), have been embellished, and the province of the Fayum gained for agriculture. The latest excavations of Fl. Petrie have proved that *Amenemhêt III.* was the king Moiris of Herodotus, who constructed a great basin for a branch of the Nile flowing into that oasis and losing itself in swamps. In the middle of the basin the two pyramids (i.e., large bases), with the colossal statues on the top were found, and near the pyramid of the king at Hawara the largest of all Egyptian temples, the so-called Labyrinth, of which, unfortunately, only some foundation stones have been preserved, representing not Abraham's immigration as some have thought, but a caravan of Semitic merchants, found in a tomb of dynasty 12 at Benihasan. It refutes the wrong opinion that Egypt excluded strangers even more rigorously than China. The succession of the different kings called Amenemhêt and Usertesen is: A. I., U. I., A. II., U. II., U. III., A. IV., and a queen Sebknefrurê, who reigned altogether 194 years. After this family had died out Egypt returned to its former bad condition in dynasties 13 and 14. Of more than 130 kings, the greater number reigned only two to four years, many some months, and probably different usurpers claimed the crown at the same time. Few monarchs, as Neferhotp and Sebkhotp V., gained sufficient power to leave some monuments. At the end of the Middle Empire (2000 or later), Egypt suddenly was conquered by a foreign people, whose rulers Manetho calls *Hyksos*, i.e., shepherd kings. Their statues show that they had emigrated from a remote country, and were of non-Semitic (Turanian ?) race. After some time the Hyksos kings allowed tributary princes in Upper Egypt, and kept only the Delta under their direct domination. For their capital, they built a strong fortress in the Sethroitic nome, on the northeastern frontier, called Auaris (Hatuaret), where a numerous garrison watched the subject country. Their god was the warlike Sutekh, but they accepted the Egyptian language and customs. The uncertainty concerning the duration of the Hyksos time (dyn. 15-17) and the number of its kings is responsible for the defects of the earlier chronology. The tributary princes of Thebes (dyn. 17) became more and more powerful, until Sekenenrê III. after 1700 threw off the yoke of the foreigners, provoked, as a popular tale relates, by the insolence of his sovereign Apoph (is). He was slain, but his son, Kames, and afterward Amosis (Iahmose), who married the princess Nefertare and succeeded to the old Theban family, continued expelling the Hyksos, until they surrendered, besieged in Auaris, their last fortress. Amosis, the first king of dynasty 18, inaugurated the glorious period of conquest, introducing Egypt into universal history. His unlimited power (the many small princes had disappeared during the war) and the army maintained and practiced in the long struggle, enabled Amosis to conquer Phenicia and Palestine, where, in his fifth year, he took the city of Sharuhén (in Simeon). His son, Amenophis I. (Amenhotp), fought in African countries. Thotmosis (Dhutmose) I., penetrated into Nubia beyond the third cataract, and in Syria to the Euphrates river. His minor son, Dhutmose II., reigned with his elder sister and wife, Hatshepsut (not Hatasu). After his early and, perhaps, violent death, his sister reigned 21 years alone. In one of the finest buildings of Egypt, her temple at Deir el-bahri, the great expedition to Punt is represented as the most remarkable event of her reign. Punt (*Phut* in the Bible), the southern coasts of fertile Arabia and especially the Somali coast, furnished gold, rare animals, and incense, the most valuable article for the cult. Hatshepsut first equipped, instead of single ships, a fleet which brought living incense-trees to be planted in Thebes. After her death, a half-brother succeeded, the greatest conqueror among the Pharaohs, Thotmosis (Dhutmose) III., (about 1550). His reign of 33 years saw at least 16 campaigns in Syria. In the first one, he defeated a coalition of all princes of Palestine and middle Syria at Megiddo, but many efforts afterwards were necessary to subject the strong cities in southern Libanon, Phenicia, and Kadesh, on the Orontes. Then he conquered Nah (*Naharin*, i.e., "flat Syria"), near the Euphrates, with the princes of Tunep, Khaleb, Karkamish, and set his landmark at *Ni* on the Euphrates. In northern Mesopotamia he devastated Mitanni (the *Osroene* of Roman time), where he hunted elephants, but lived in peace with Assur, Sangar, and Babel. With his rich booty he embellished the temples of Egypt more than his predecessors, who had all been great builders, and the temple of Karnak owes its splendor mostly to him. Amenhotp II. suppressed rebellions in Syria and kept the frontier at *Ni*, probably also Dhutmose IV., but Amenhotp III. lost northern Syria. The letters in cuneiform writing received from Asiatic princes, during his reign and that of his son, were found some years ago, and have thrown much light upon his diplomatic relations, especially upon those with Mitanni, whose king, Sutarna, sent his daughter with 317 female slaves to the Pharaoh. His son, by the beautiful and influential queen Tiye, Amenhotp IV. (1450) caused a great revolution by trying to replace the old mummified religion by a *solat* monotheism, and persecuted the worship of the god Amon so persistently as to obliterate

his name on earlier monuments and to change his own name containing "Amon" into "Sun's splendor" (Akhunaten). He built a new capital at Tell el-Amarna in Middle Egypt. After his death, the new religion, which had met with great opposition before, was destroyed with its monuments under the following ephemere kings (Ay, Tutankhamon). Haremheb finished the restoration of the old creed. Ramses I., the founder of dyn. 19, died soon. Sety Sethos), whose tomb in Biban el-Moluk is the finest of all, attempted to win again the northern provinces, which had fallen into the hands of the Kheta (Hittites), a people coming from Cappadocia. His son, Ramses II., or Sesostris (1380), continued, and in addition to Galilee and southern Phenicia, conquered Phenicia to the Dog's river (*Lycus*) near Beirut, defeated the Hittites at Kadesh on the Orontes (Laodicea ad Libanum), and suppressed revolting Palestine. After 20 years he made peace and married a daughter of the Kheta king. The numerous representations of the same modest victories on his monuments caused the Greeks to believe him to have been a conqueror of half the world. His activity as a builder during his reign of 67 years was beyond comparison, although he usurped many monuments, replacing earlier names by his own. Two-thirds of all monuments bear his name, the temple at Luxor, that of Abusimbel in Nubia cut into the rock, etc. He built the cities of Pitorn and Ramses, and was the king who oppressed the Israelites. Under his son, Merneptah, the Libyans devastated the western Delta, and pirates from Asia Minor and Europe its shores—the Akaywash (Acheans?), Tursh (Tyrsenians?), Shardin (Sardinians), Luk (Lycians), and Shakarush, who at that time appeared in the Orient as pirates and mercenaries. These enemies joined their armies near Heliopolis, but were defeated by Merneptah. He was the king of the Exodus, but no monuments as yet aid the difficult connection of Egyptian history with the biblical record. Dynasty 19 ends ingloriously with anarchy and the reign of a Syrian usurper. Dynasty 20 is founded by Setnakhte, whose son, Ramses III., is a feeble imitator of Ramses II. in every respect. He repelled several invasions of the Libyans, defended Egypt and the Syrian provinces against the pirates and incursions of barbarous swarms coming from Asia Minor, and plundered the country of the Amorites (at that time, 1250, between Libanon and Anti-Libanon). His palace and favorite temple was at Medinet Habu. Records of a conspiracy in his harem are preserved. The line of nine Ramessides after him seem to have reigned in peace without any remarkable event. The feebleness of the last kings caused the high priests of Thebes, who had become very rich by the donations of Ramses III., to depose them. Then a new dynasty from Tanis took the throne. Under their rather inglorious reign, the police gave up trying to protect the tombs of the preceding kings against thieves, who had already plundered some under Ramses IX. (records in a papyrus in London), and hid the mummies in an excavation where they were discovered in 1881.

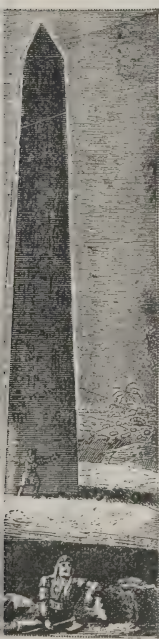
Dynasty 22 (950) was of Libyan origin, because the Libyans, especially the tribe of the Mashiash as mercenary soldiers, had become so influential that their commanders were next in position to the king. Shoshenk I. (*Shishak* of the Bible) is known by his campaign despoiling the cities of India and Israel under Jeroboam and Rehoboam. Under the later kings and those of dynasty 23 (from Tanis), Shoshenk, Usorkon, and Takelot, the unity of the empire was lost. Tefnakht and his son, Bocchoris (Bekenranf), of dynasty 24 were only princes of Sais and Memphis. When the first tried to subdue the many Libyan commanders reigning in the cities of the Delta, he was stopped by king Pankhy of Napata. After B.C. 1200, Ethiopia became an independent civilized kingdom, and in dynasty 23 even conquered Upper Egypt. Bocchoris was burned alive (?) by Pankhy's second successor, Shabaka, and the whole of Egypt became an Ethiopian province (728, 25th dyn.). The vice-king of Shabaka, Sebe, united the kings of Syria against Assyria, the power of which threatened even Egypt, but the Assyrians destroyed Samaria and the kingdom of Israel (722), likewise Hamat, and defeated Sebe at Raphia. Taharka (*Tirhaka*, Bible), the successor of Shabaka and Shabataka (704), repeated this attempt, but Sanherib defeated him at Altakeh. An epidemic prevented the Assyrians from capturing Jerusalem, whose King, Hiskiah, had joined the Ethiopians, and from attacking Egypt; but Assarhaddon (671) conquered Egypt and divided it among 20 tributary princes from the old families of Libyan officers. In 668 Taharka drove out the Assyrian garrisons, and another unsuccessful attempt by his successor Tan(ut)amen (663) was not repeated. When the Assyrian empire began to decline, Psametik of Sais, an heir of the princes of dynasty 24, founded dynasty 26 (before 650), with the help of Ionian and Carian mercenaries. A large part of his Libyan troops deserted to Ethiopia. Nekao II. (609-594) began the canal connecting the Nile with the Red sea, and sent Phenician sailors around Africa; he killed Josiah of Judea and conquered Syria to the Euphrates; but lost it, having been defeated by the Babylonian crown prince, Nebuchadnezzar, at Karkemish. Apries (*Hophra*, Bible), 588-69, successor of Psametik II., was not able to prevent the destruction of Jerusalem by Nebuchadnezzar (586). A military revolt deposed him. Amosis II. (Amasis), 569-526, reigned with diplomatic skill and conquered Cyprus. His son, Psametik III. (Psamenit), reigned one year; in 525 Cambyses defeated him at Pelusium, and Egypt became a Persian province. It revolted (487) under Khabbash, in 460-50 under Inaros and Amyrteus (with Athenian aid), and more successfully about 400. Five national kings reigned; the last, Nectanebus, lost Egypt 342.

Soon Egypt became a province of Alexander, who founded Alexandria. After his

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EGYPT.—1. Cleopatra's needle. 2. Pyramid of Gizeh, and sphynx. 3. Rock-temple of Isar. 4-11. Articles used in religious worship. 12-16. Amulets and jewelry. 17. Cartouchments. 27. Litter. 28. Chair. 29-34. Household utensils. 35-37. Tools. 38. Toilet.



11. 4. Front elevation of a palace. 5. Ground-plan of house. 6. Nile ship. 7. Table.
18, 19. Sandals. 20. Chariot. 21. Couch. 22. Metal mirror. 23-26. Musical instru-
ment.

death, his general, Ptolemæus (306), assumed the title of king of Egypt. (See PTOLEMY I.) Augustus made Egypt a Roman province under a governor of equestrian rank. It remained a quiet possession; only Zenobia's conquest (270 A.D.) and Firmus' revolution (272) are to be noted. Even before the temple of Serapis in Alexandria was destroyed (391) the country was Christianized, and here gnosticism, Arianism, asceticism and monasticism (beginning already in pagan time) developed themselves. The times of the successors of the Romans, the Byzantines, were filled with sectarian troubles (between Jacobites and Melchites), which enabled first the Persians (616-628) and then, on the invitation of the Coptic governor, Makaukas, the Arabs (640) under Omar I. to enter. In 668 the Arabic governor, Akhmed, made himself independent of the caliphs of Bagdad. His family, the Toulounides, were replaced by the Akhsidides (935), these by the Fatimides (969), Moizz Eddin Allah, who built Cairo. Saladin, a Kurd, founded the dynasty of the Ayoubites (1171). He fortified Cairo, brought Egypt to great wealth, conquered Syria and successfully waged war with the crusaders, destroying the kingdom of Jerusalem.

Louis IX. of France, after taking Damietta, was captured in 1249 by the first sultan of the Mamelukes (q.v.). Baharite and Bordjite, Mameluke sultans, although conquering Cyprus in 1426, reduced the country to poverty and anarchy. The Turkish conquest (1517) by Selim I. left the power of the Mameluke chiefs nearly unchanged; the Turkish pasha was without power, and one (Ali Bei, 1763) made himself quite independent. In 1798 Bonaparte invaded Egypt and defeated the Mamelukes near the pyramids, but the French government in Egypt was expelled by the Turks with British help in 1801. Pasha Mohammed Ali (1806) murdered the Mamelukes and formed an army which conquered Nubia (1820) and parts of Arabia (1816), but lost many troops in aiding the Porte during the Greek revolution. In 1831 he rebelled and conquered Syria. In 1839 after the victory at Nisib he was about to gain the whole Turkish empire, and was only prevented by the intervention of the quadruple alliance (Russia, England, Austria, Prussia), which forced him to evacuate Syria and renew his dependency on the Porte. He did much for the country by improving the irrigation, the cultivation and the security, but nearly ruined the people by innumerable taxes and monopolies. He died in 1849, his grandson, Albas Pasha, in 1854, Saïd Pasha in 1863. These pashas again brought the country to wealth. Ismail Pasha, who first received the title *khedive* or viceroy from the Porte, did much for the construction of the Suez canal by De Lesseps, conquered the enormous provinces of the Soudan (Darfur, Harar, etc.), and promoted European culture very much. He was forced by the Porte several times to reduce his too numerous army and navy. His externally splendid government led to so miserable a state of the finances that in 1875 he sold his 176,602 shares in the Suez canal for £4,000,000 to England. In 1876 the revenue was put under the management of European commissioners; in 1878, the khedive's private property went to help the payment of the interest on the public debt. When, in 1879, he dismissed his financial minister, Nubar Pasha, and refused the payment of interest, the European governments forced his abdication in favor of his son Tewfik. This interference on the part of foreign powers, and the resulting retrenchments in the Egyptian government's expenditure, caused such discontent that a revolt broke out, headed by Arabi Pasha (q.v.), a colonel in the army. The demands of the insurgents were, that the army should be increased to its normal strength, that the prime minister of the khedive, Riaz Pasha, should be deposed, and that a chamber of notables, or national parliament, should be convened to assume the government of the people as a representative body. Riaz Pasha had in the preceding February made himself unpopular by resisting the demands of Arabi and other protesting colonels, and laying a treacherous plot for their seizure. Tewfik, alarmed by the proportions which the revolt had assumed, agreed to substitute Sherif Pasha in the place of Riaz, and to convene the chamber; but he urged that he could not increase the numerical strength of the army without the consent of the foreign commissioners. A chamber of notables was summoned, which met at Cairo before the end of the year, and, in 1882 (Jan. 4), Arabi Bey was taken into the new cabinet as assistant secretary of war. When it was found that France and England, through the controller general, were inclined to resist all the demands of the chamber that would limit foreign interference in the management of the finances, the resentment of the popular or "national" party rose to fever heat. Sherif Pasha favored the European powers. He was therefore forced to resign (Feb. 2); and a new ministry was appointed, with Mahmud Sami and Arabi Pasha at its head. But the khedive and his ministers represented such opposite lines of policy that it was evident that a rupture between them was imminent. In the middle of May the crisis came. Some Circassian officers who were favorites of the Turkish sultan had been convicted of plotting the death of the ministers. The khedive commuted their sentence of loss of rank and banishment to simple banishment. His action was violently attacked by the nationalists, but was supported by the sultan and by the controllers. England and France each sent a fleet to Alexandria, May 17, to maintain the authority of the khedive, and demanded the resignation of the ministry and the exile of Arabi. The ministers obeyed, but a popular outbreak caused the khedive to reinstate Arabi. He was now the idol of the army and the populace, who, encouraged by their success, were breathing threats of violence against their foreign oppressors. While matters were in this condition an ordinary street fight in Alexandria culminated in a general uprising of the native pop-

place against the Europeans, June 11. Arabi was commissioned by the khedive to restore order, but his known sympathy with the rioters only increased the panic of the foreign colony, which fled from the city in dismay. England and France had vainly urged the sultan to send troops into Egypt to enforce the authority of the khedive and to suppress the growing power of Arabi, who was virtually dictator of the country. As the French hesitated to act, the English took matters into her own hands. A *casus belli* was found in the fact that certain forts in the Alexandrian harbor were being armed by orders of Arabi. The English admiral, Sir Beauchamp Seymour, accordingly bombarded the town. On the next day, the insurgents evacuated Alexandria, leaving it in flames, and entrenched themselves at Kafi Dowar about twelve miles distant. The khedive sought refuge with the English fleet. He was formally deposed by the nationalists, who organized a provisional government at Cairo, and intrusted the defense of the country to Arabi. Meanwhile the English, after an ineffectual siege of some weeks, abandoned the attack on Kafi Dowar, and an Anglo-Indian army of 40,000 men was sent across the isthmus of Suez under command of Sir Garnet Wolseley. They landed at Ismailia; and advanced to Tel el Kebir, where a large army of insurgents had thrown up intrenchments. After several bloody battles they finally succeeded in storming the enemy's lines, Sept. 13. A forced march was then made on Cairo, which was reached by nightfall. Arabi at once surrendered himself as a prisoner of war, the national army was disbanded, and the khedive restored to his authority. Arabi was sentenced to death, but the sentence was commuted to exile on the island of Ceylon. Various reforms were now introduced by the English, acting through Lord Dufferin, who was appointed special commissioner to Egypt. The so-called dual control was abolished 1883, in January, in spite of the protests of France; and in February, Sir Auckland Colvin was made financial counsellor to the khedive. An army of occupation was deemed necessary for a while to preserve tranquility; but it was promised that their numbers should be steadily diminished. This promise, owing to a serious outbreak of the Arabs in the Soodan (q.v.) and the inherent weakness of the khedival government, has not yet been redeemed; and at present (1893) Egypt has practically become a dependency of England, garrisoned by English troops and with a government whose policy is in all things directed by the representative of England, though still carried out in the name of the khedive. (See the following paragraphs.)

Government.—The administration of Egypt is carried on by native ministers, subject to the ruling of the khedive. From 1879 to 1883 two controllers-general, appointed by France and England, had considerable powers in the direction of the affairs of the country (constituting the so-called dual control). In the summer of 1882, in consequence of the military rebellion just described, England intervened, subdued the rising, and restored the authority of the khedive. In this intervention England was not joined by France, and as a result, on January 18, 1883, the khedive signed a decree abolishing the joint control of England and France. In the place of the dual control the khedive, on the recommendation of England, appointed an English financial adviser, without whose concurrence no financial decision can be taken. The financial adviser has a right to a seat in the council of ministers, but he is not an executive officer.

The Egyptian ministry is at present composed of seven members, among whom the department work is distributed as follows: 1. President—Interior; 2. Finance; 3. Justice; 4. War; 5. Public Works; 6. Instruction; 7. Foreign Affairs.

On May 1, 1883, an organic law was promulgated by the khedive creating a number of representative institutions, based on universal suffrage, with a view of carrying on the government of the country in a more constitutional manner. These institutions included a legislative council, a general assembly, and provincial boards.

The legislative council is a consultative body in matters of legislation, to which all general laws are submitted for examination; but the government is not obliged to act on its advice. The functions of the two other institutions are also of a limited character; but no new direct personal or land tax can be imposed without the consent of the general assembly, which has to be summoned every two years.

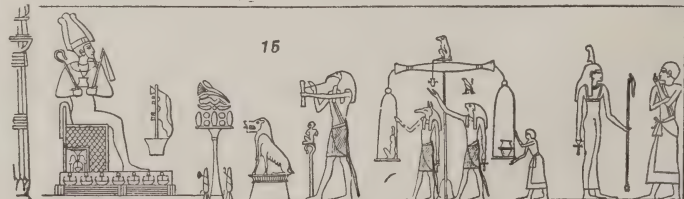
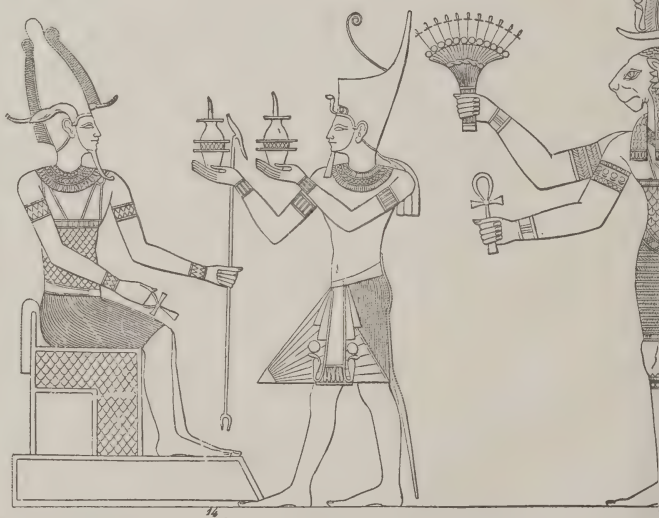
Egypt proper is administratively divided into 5 governorships of principal towns, and 14 *mudirihs*, or provinces, subdivided into *kisms*, or districts.

Army.—On September 19, 1882, the whole of the Egyptian army was disbanded by khedival decree. In December of the same year, the organization of a new army was entrusted to a British general officer, who received the title of Sirdar. There are about 60 English officers serving at present in the Egyptian army. The army has a total strength of 17,000.

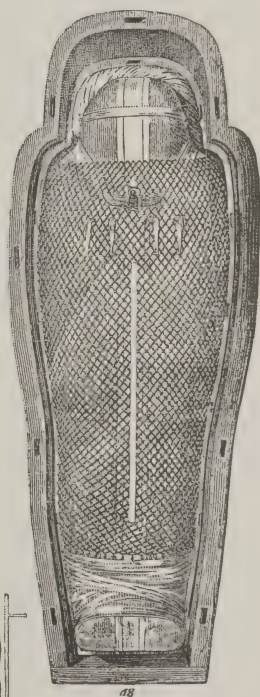
Since the rebellion in 1882, an English army of occupation has remained in Egypt. Its strength, January 1, 1897, was 4500. The Egyptian government contributes a large sum each year to meet the cost of its maintenance.

Population.—The population of Egypt, inhabiting a total area of 400,000 sq. m., of which only 12,976 sq. m. are cultivated, was found to be, at the last census (June 1897), 9,654,323, including 125,000 foreigners. The principal towns, with their population in 1897 are Cairo, 576,400; Alexandria, 319,767; Damietta, 43,477; Tintah, 33,725; Mansourah, 26,784; Zagazig, 19,046; Rosetta, 16,671; Port Said, 35,000; Suez, 18,068.

Religion and Education.—The prevailing religion in Egypt is the Mohammedan, but some 300,000 Copts are Christians, over whom preside the Patriarch of Alexandria, three



EGYPTIAN DEITIES.—1. Nu. 2. Mu. 3. Tefenut. 4. Seb. 5. Isis. 6. Anubis. 7. 14. King Sethos bringing sacrifice to Osiris. 15. Judgment of the dead. 16. Fun



1. 17. Mummy. 18. Mummy in case.
 6. Hathor. 8. Thoth. 9. Saf. 10. Seback. 11. Horus. 12. Selk. 13. Ethiopian deity.

metropolitans and 12 bishops. In 1895 there were about 9000 schools and 11,000 teachers. In most of these schools education is confined to the elementary branches.

Commerce and Finance.—In 1896 Egypt imported goods to the value of \$59,373,490, and exported products valued at \$46,330,000. Her chief product and article of commerce is cotton. In 1889 out of 3781 villages, 2685 were occupied in the culture of cotton.

The total debt of Egypt, Jan. 1897, was \$508,000,000. The budget for 1897 shows a revenue of \$51,000,000 and an expenditure of \$50,000,000.

Ancient Egyptian Language and Literature.—Egyptian was a branch of the Hamitic family of languages, connected with all the dialects of the light race of northern Africa, and it is incorrect to regard it as though nearer related to the Semitic family, since those African languages are known only in the form of 19th century Egyptian on monuments 5000 years old. This earliest branch is thus the link connecting the Semitic and Hamitic families and showing that they had one root. It is in about the same degree of development as the Semitic languages, having passed the agglutinative state; and only the peculiar kind of writing has induced many to believe it a monosyllabic and very simple tongue. The hieroglyphs express (as do the different Semitic systems of writing, except Assyrian) only the consonants of every word; the vowels are to be supplied by the reader, and therefore modern scholars disagree very much in their transcriptions. The language underwent many changes during its long history, and the difference between the archaic style and the living language became so great about 1400, that the popular style is called Neo-Egyptian as a special language. Later inscriptions, however, mostly are bad imitations of the earliest language. The hieratic writing is only a cursive and easy form of the hieroglyphic, used in daily life and in secular literature. After 700, the cursive forms developed a kind of shorthand, the Demotic, which is often wrongly called the popular dialect, although it is a style of writing and not a language. This stenography was in common use for papyri in the time of the Ptolemies and Romans, and therefore it was called "the popular writing" (*demotic*). The most recent demotic text dates from the 5th century B.C., an hieroglyphic inscription of 250 B.C. Christians wrote the language in its earliest form with Greek letters, adding five new letters and a syllabic sign, and this dialect was called *Coptic*, i.e., *Egyptian*, by the Arabs. The Coptic had a literature nearly exclusively religious. As a living language it died out some centuries ago, and now the Copts read their prayers without understanding them. The early literature was very rich, as can be seen from its many fragments. After the magic texts copied on the walls of the tombs, the *Book of the Dead* (q.v., under DEAD) is the earliest and most remarkable religious work, a collection of hymns and magic formulæ, serving as guide-book for the lower world, describing its stations, and giving magic protection against its dangers. Although the text in the form published by Naville, from manuscripts of the 17th to the 12th century B.C., is corrupted to senselessness, it never was very rich in thought. In general, all philosophical literature is wanting. Contrary to expectation entertained before the decipherment of hieroglyphics, collections of moral rules (*pap. Prisse, Prescriptions of Ani*) show no philosophic ideas. Many magic and ritualistic texts are found in the tombs, but the current literature consisted mostly of short tales and historic novels, being often pretty and fanciful. Love songs also have been found. Egyptian science bears, as has been said, a merely practical character. A short school-book on mathematics has disappointed expectation, as medical papyri have also done. The largest one (*pap. Ebers* in Leipzig, written about 1600 B.C.) shows at least little knowledge of anatomy. Many letters, acts, and deeds still exist. The larger papyri are mostly copies written in schools for practice. The classic style, of Dyn. 12, imitated in most poetical works, is not clear and simple enough for modern taste. The masterpiece of epic style, the song of Ramses II.'s victory at Kadesh, is too long and without action. Also the demotic papyri contain many copies of earlier books, tales, poems, etc. In general the literature is equal to most oriental literature, but without those features of learning and wisdom which the Greek writers lead us to expect.

Ancient Religion.—The religion of Egypt grew from a low kind of fetishism. Every village in prehistoric time had its own god or demon, worshiped in an object, a tree, or an animal. The towns united the gods of the surrounding places into one family, bringing them into relation with the town deity. Thus every town-god has a "divine circle" around him. Very soon solar worship began, Re probably being the earliest god. But his name was not accepted everywhere, several local deities also being identified with the sun. Horsus became a most general form of it; in Heliopolis the sun was called Atum; in Hermonthis, near Thebes, Montu, etc. Osiris, the local god of Abydos, thus became the setting sun, the ruler of the lower hemisphere, consequently the god of the region of the dead, and in this character, the most popular god of Egypt. As all local gods, with or without connection with the celestial phenomena, remained, and later were worshiped in the whole country, and none of the different sun-gods replaced another, the confusion which we find already in the earliest texts makes it impossible to construct any system. The Egyptians attempted such constructions very soon, but their families and genealogies of the gods, their identifications of one god with another (very few gods failed to receive a solar character in later times), or division of the natural forces among the gods, only increased the confusion. After the reformation of Amenophis IV., introducing a solar monotheism, had failed, the people

remained in an indescribable degree of uncertainty in religious belief, to which only the myth of Osiris gave some life. The religious movements among the priests did not touch them. These movements had led remarkably towards monotheism and a higher conception of the divinity before that revolution. Suppressed for some time, they ended in magic superstitions. Pantheistic ideas, which necessarily sprung up from the identifying systems, found their extreme after 600 and later. The principal and most popular personalities of the innumerable pantheon are: Osiris, worshiped especially at Abydos, and Busiris. Isis appears as his sister and wife, Horus (the young, i.e., rising sun), who had his most famous temple at Edfu, as his son. Nephthys, his other sister, is married to his brother and murderer, Set (Typhon). The shacal Anubis, the guardian of the inferior region, is a son of Osiris and Nephthys. Set, originally a personification of the earthly powers opposed to the sun, then of all irregularities in nature, later of everything violent, therefore also of war, after 1000 B.C. became a Satan. The parents of these four gods are Seb or Keb, and Nut, who are explained as earth and heaven. The parents of these are Shu, the æther, and Tefnut (emanation?), while the father of all the gods is Nu, the abyss (other personification Nun or, as woman, Nunet). The ibis Dhoute has become a moon-god and father of sciences, similar to the Greek Hermes. Ptah of Memphis is considered as a creator of the world, being a workingman and artist (Hephæstus). The cow-formed Hathor, whose principal temple was at Dendera, finally received the attributes of a love-goddess. At Thebes, we find Amon, after 1600 the general protector of Egypt, and with him Mut and Khonsu; at Eileithyia, goddess Nakhbet, to whom corresponds Udjoit (Buto), in the Delta; at Sais, the Libyan goddess Neit; in the Fayum, the crocodile Sobk (Souchos); the cat Ubastet (Bast) in Bubastos; the ithyphallic Min at Chemmis; at Elephantine the ram Khum (Chnuphis) and the goddesses Anuket and Satet; at Memphis, the god of medicine, Imhotp; etc. Under the New Empire many Semitic gods were introduced as: Baal, (Rashpu)=lightning, Bes,=Astarte, Anat, Kadesh. Many gods, as Khepre(r), another creator of the world, and many genii of the lower world, had no local worship. The animals worshipped as gods even in latest time were the bulls Apis at Memphis, Mnevis at Heliopolis, Bachis at Hermonthis, and the goat Mendes. Other animals were sacred to particular gods—everywhere the cat, in some places dogs, etc.—but were no incarnation of gods as those named above.

Ancient Inhabitants and their Culture.—Language and anatomy show that these belonged to that branch of the Caucasian race which inhabits northern Africa, and represented this race very purely in most ancient time, only later receiving some negro blood. Already in Dyn. 4, they appear perfectly civilized. Art and architecture were at their full height; the state was well organized. But the power of the country was in the hands of a few noblemen, and the whole of the population seems to have consisted of serfs. Only in the Middle Empire, a middle class of priests and scribes becomes remarkable. During the New Empire the princes of provinces were replaced by officials appointed directly by the crown. Military officials had precedence over priestly ones, as in that time of conquest the soldiers had gained the leading part in the state. However, the Egyptians themselves were not warlike, and from earliest times depended upon foreign mercenaries. Although in soldier-families the connection with the army commonly was inherited, the Greek reports concerning the division of the people into priests, warriors, and three or four other "classes" must not be mistaken for castes like those of India. There existed no restriction concerning the choice of business or intermarriage of classes. Education was rather common, although, of course, clerical offices and studies mostly remained with the priests. The commercial activity of Egypt was very great, but in the north soon passed into the hands of the Phenicians, because of the Egyptian disinclination to maritime sailing. The well-developed manufactures furnished material for exporting. It must be remarked that iron was always known and used, but that tools and weapons mostly consisted of bronze or copper, and stone implements were still in use after B.C. 2000. As money, metal in rings was used at least after B.C. 1600. The greater part of the people were devoted to agriculture. Although working with primitive means, they knew how to make their labor very successful, for Egypt had far more numerous a population than now (over 7,000,000 under Nero). The Egyptians were by no means a grave and philosophic people, but gay, and show us enough of their entertainments and pleasures, such as hunting, fishing, music, dancing, and many plays. They were also less sober than other oriental peoples, drinking much beer (less wine), and were hardly more moral than the Greeks. We cannot even say that they were religious, only many superstitious ceremonies and the great care bestowed upon the life after death led foreign peoples to believe this. The mummification was at first a privilege of the highest classes; later it was cheaper, and therefore general. Much expense was devoted to the equipment of the dead, their protection by talismans and magic papyri in the tomb, and the sacrifices for their souls. After B.C. 2000 the cult of the defunct lost something of its interest. On the contrary, the priests after that time gained more and more in property and influence, which was reduced only by the Ptolemies. The absolute power of the king, who enjoyed divine honors, was limited first by the counts (nomarchs), and then by the priests, and their foreign guards. The poor condition of the agricultural class, the serfs of the king or other great land-owners, was hardly changed during the whole history of Egypt. Justice was well developed, even modern

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juries having their precedents in Egypt. The legal independence of the women is most remarkable. The wife was in property perfectly equal to the husband. Polygamy existed, but was rare. Marrying the sister was almost a common custom. In general, Egyptian civilization resembles the modern more than that of any oriental peoples.

Art of Ancient Egypt.—Sculpture and painting were bound by the canon of proportions, and the great conventionality of this caused stiffness, especially in the representations of human figures. The style was most free before 3000 B.C., and the finest works of Egyptian art (statues and bas-reliefs) date from that time. Although later art has left remarkable works, it did not follow any new and original direction. The reformation of Amenhotp IV. (1450), caused also a revolution in art and led to a most naturalistic tendency, favoring even the ugly, but disappearing with that king. The representations covering large walls and the architectural use of sculpture may have been developed a little later, but all originality was lost; also the "renaissance time," during Dyn. 26, produced only elegant imitations of the earliest art. Later, art sank to a very low degree. At all time, the manual skill of the Egyptians in cutting the hardest stones is admirable; we know that besides very imperfect tools, diamonds were also used. Also the architectural use of sculptures, in the brightest colors, is of high perfection. These sculptures are mostly bas-reliefs worked not out of the wall but in it, and not prominent but deepened (intaglio). All representations of animals are less stiff by the canon of forms, and are therefore good and naturalistic. A humorous tendency (caricatures have been preserved) is remarkable in most sculptures. Painting had only an architectural character; neither perspective nor shadow were observed. The art of casting bronze statues was known in the earliest times, likewise the manufacture of glass and of that glazed pottery which is erroneously called Egyptian porcelain. The influence of Egyptian art upon that of all nations of western Asia was very strong. Their music seems not to have reached a higher degree of excellence, though a great variety of instruments are represented.

The Architecture of Egypt was at first very simple, but it seems that at least before B.C. 2000 most of the different architectural forms were developed. The inclination of the walls thickened below on the outside, always remained the primitive style. All decorative forms were derived from the vegetation of Egypt, the lotus flower and button, the palm branches, the papyrus. The columnar forms imitate the same models, but the proto-doric columns of Beni-Hassan (2500 B.C.) and other forms show how much Greek art has borrowed from Egypt. Among architectural figures, the sphinx takes the first place. When used in alleys to protect the roads leading to the temples, it changed often with figures of rams or lions. All temples consisted of a shrine before which a number of rectangular courts, colonnades, halls, and pylons or tower-like door-buildings were constructed. Towers were not constructed with them. The arch was known but rarely used; enormous stones supported by pillars formed the temple roofs. Whether the gigantic blocks, hardly mastered by modern engineers, were moved by skillful machinery is doubtful; the combined forces of thousands seem to have placed them. The character of the private architecture was opposed to the solidity of the public buildings, light structures of wood and sun-dried bricks, of which no durability was expected. (See OBELISK, PYRAMID, SPHINX.)

For the monuments of Egypt see as references, Rosellini, *Monumenti* (1832-44); Champollion, *Monuments* (1835-45); Lepsius, *Denkmäler* (1849-58). For the history (no book in English is reliable), Maspero, *Histoire des Peuples Orientales*, 2d ed.; E. Meyer, *Geschichte Aegyptens*. For the manners and customs, Wilkinson, 2d ed. (1879); better, Erman, *Aegypten* (1885). For the religion, Lepage-Renouf, *Lectures* (1880). For the language, the dictionary of Brugsch (1867-80). No grammar has been written which is reliable: Lepage-Renouf (1875); better, Brugsch's *Grammaire Hiéroglyphique* (1872); Loret, *Manuel* (1887); two grammars of special periods by Erman (prof. in Berlin). Much material is found in *Zeitschrift für Aegyptische Sprache*, *Recueil des travaux*, *Proceed. of the Soc. of Biblical Archaeol.*, and *Papers of Egypt. Exploration Fund*. The most important inscriptions translated are in *Records of the Past* (London, 1874-79), but only the 2d edition can be recommended. For the art, Perrot and Chipiez, *History of Art*, and Maspero, *L'Archéologie Egyptienne*. For the modern conditions, a large number of traveler's day-books published yearly have not yet furnished anything equal to Lane, *Modern Egyptians* (1842). For statistics, see the *Statesman's Yearbook* for 1893.

EGYPTIAN MUSIC. Information regarding ancient Egyptian music is extremely meagre. Herodotus describes a festival in Bubastis, on which occasion "men and women embark together in great numbers. During the voyage some of the women beat upon small drums, while some of the men play on the flute. The rest of the people of both sexes sing, clapping their hands together at the same time. . . . Among other memorable customs the Egyptians sing the song of Linus, like that sung in Phenicia, Cyprus, and other countries, where it bears a different name. But the person they praise in this song is evidently the same whom the Greeks celebrate under the name of Linus. The Egyptians call him Maneros, and they say that he was the only son of the first king of Egypt. Happening to die in the prime of life, he is universally lamented by the people in this dirge, which is the only song of the kind in Egypt." The Egyptian hymns are thus described in the *Introduction to the Study of the Egyptian Hieroglyphs*, by Samuel Birch (London, 1857): "Plato speaks of the hymns of Isis.

which were apparently in the form of colloquies. Certain books which passed under the name of those of Horus and Isis are spoken of by Lucian. There were also ancient lyrical poems containing the praises of the gods and ancient heroes, and sung at ceremonies and entertainments, and deaths, when threnes, or funeral dirges composed in rhythm were chanted for the deceased. Among the encomiastic odes is mentioned one in the honor of Sesostris, which differed from the historical accounts. Hymns were also addressed to the rising and the setting sun, and to Ammon, to obtain his oracular responses to the Oasis. Of these the most important were the *threne*, i.e., the dirge, or lament for Maneros; another, addressed to Saturn; and a chant called the Genethlia, or Birth of Horus." The instrumental accompaniment to the singing of the men and women consisted of a lyre, a harp, and a double-pipe. A combination of flutes is represented on one of the tombs in the pyramids of Gizeh, and dates, according to Lepsius, from the 5th dynasty. Instruments were combined variously for orchestral music. In martial music instruments of percussion were employed. The Egyptians had no notation, and preserved their music in hieroglyphs. The song of the oxen treading out the corn is one of the oldest metrical poems of the Egyptians.

The Egyptian instruments known through sculpture, painting, and well-preserved specimens, are the harp, the trigonon, the lyre, the tamboura, pipes, flutes, double-pipes, trumpets, drums, tambourines, the sistrum, crotala, cymbals, bells, and curious stringed instruments, and instruments of percussion. The harps varied greatly in size, shape, number of strings, and in decoration. While performing, the player stood, knelt, or supported his instrument upon a stand. Of the scale to which these harps were tuned no reasonable idea can be formed. The Egyptian name for the harp was *buni* or *beni*. The most elaborate specimens of the Egyptian harp were found by the traveller, James Bruce, painted in fresco on the wall of an ancient sepulchre, at Thebes, supposed to be the tomb of Ramses III., who reigned about 1250 B.C. The *trigonon* was a triangular-shaped harp, resembling the lyre. A curious semi-circular instrument of this kind was discovered in Thebes in 1823. Its wooden frame was covered with red leather, and it was mounted with twenty strings of catgut, which still emitted sound when made to vibrate. In the ancient Egyptian trigonon the front bar, which would complete the triangle, is wanting. The lyre of the ancient Egyptians varies in shape and in the number of strings. Some resemble the Assyrian lyre; some were held perpendicularly when played upon, and others horizontally. The frame was frequently ornamented with the carved head of the horse, gazelle, or some favorite animal. The harps and lyres are supposed to have been tuned in the pentatonic order, without the addition of foreign intervals. The body of the tamboura was either oval or with the sides curved inwards, like the violin or guitar. Some instruments had four pegs, some only two, and in the representations of others these are left out, either through carelessness, or because they were situated under the neck. The tamboura was played with a plectrum, and sometimes was provided with frets. Its Egyptian name was *nofre*, and signifies "good" in the hieroglyphs. The instrument seems to have been held in high estimation, for its figure is found on vases and on other pottery. The Egyptians had another kind of tamboura, resembling our modern guitar, and the Arabian 'ood. The stringed instruments differed so much from our own that it is difficult to class them. These have been discovered in various states of preservation in tombs, and on hieroglyphs, and in paintings. They are of wonderful variety. Small pipes of reed with three, four, five, or more finger-holes have been discovered. In some pipes pieces of thick straw served the purpose of the so-called reed in our modern clarinet and oboe. The double-pipe was a favorite instrument. Its name was *mam*. A fragment of an Egyptian fresco painting in the British Museum represents a woman playing the double-pipe, while other women clap their hands in rhythmical accompaniment, and others dance. The ordinary flute, called *sêbi*, was very long. It was made of wood or reed. The various instruments of this order differed in length, dimension, and in the number of holes. The flute and single-pipe were played almost exclusively by men, and the double-pipe by women. Similar varieties of the flute exist in modern Egypt, and are called *nay*. The common *nay*, known as the "dervish flute," is used to accompany the songs of the dervishes at their religious dances. The trumpet was usually of brass, and of different shapes. There were three kinds of drums. A small hand-drum, still used in Asiatic countries, was two or three feet long, braced by cords, covered with parchment, hung in front of the performer by means of a band, and beaten on both ends with his hands. The second kind, found in Thebes, in 1823, was barrel-shaped, over a foot high, and two feet broad, beaten with slightly curved drumsticks, having knobs on their ends. The third drum is almost identical with the *dar abukkeh* of the modern Egyptians. The tambourine was either round, like the modern one, or of an oblong-square shape, slightly curved on the four sides. Sometimes a bar divided it across the middle, making it a double tambourine. Women appear to have played it more than men. The other instruments of percussion were various species of gongs, and the *sistrum*, a bronze frame of peculiar shape, and carried by women at religious performances. Another curious instrument was used to mark the rhythmic effects, like the *crotala* of the Greeks. This consisted of two balls, or knobs, sometimes carved in the shape of human heads, to which were affixed handles. One of these was held in each hand, and struck together to mark the time in religious performances and dances. The Egyptian cymbals

resembled our own in shape. They were made of bronze and brass, and sometime with an alloy of silver. Small bells of bronze were also known to the Egyptians. On some of them the head of Typhon, the evil spirit, is represented. These have been found in tombs, and necklaces of gold and silver are often made in imitation of little bells. The modern Egyptians are fond of music, but regard the study of this art as unworthy of serious attention. Their natural love for it is shown by the universal custom of laborers, boatmen and country people singing while at their work. Men and women are employed to sing at fêtes and entertainments. They have a variety of musical instruments. Those in most general use are: the *kemengeh*, *kánoon*, 'ood, and the *nay*. The *kemengeh* is a kind of viol. Its name is Persian, meaning bow-instrument. It is usually about 38 inches long; the sounding-body is of a cocoanut pierced with holes, over which is stretched a piece of fish-skin, on which rests the bridge; the neck is cylindrical, of ebony inlaid with ivory; the head is of ivory, and the two strings are of horsehair and gut. The bow is made of wood and horsehair. The *kánoon* is a species of dulcimer about 39 inches long and 16 broad. It is of wood with gut strings, three to each note. It is played with two plectra, one on each hand of the performer, who holds the *kánoon* upon his knees. The 'ood is a lute played with a plectrum. It is one of the oldest Arabian instruments, celebrated by numerous poets. It is held like the guitar, has seven strings of gut, and the plectrum is a slip of vulture's feather. The *nay* is a specimen of flute. It is usually 18 inches long, pierced with holes. The other instruments include tambours, tambourines, and various stringed and wind-instruments. The singing of the sailors on the Nile has frequently been noticed. It usually consists of solo and chorus, and varies with the nature of the occupation in which the men are engaged. Certain airs are sung when the sails are shifted; others when the boat is set afloat; others when it runs aground, etc. See Chappell's *History of Music* (London, 1874); Engel, *Study of National Music* (London, 1864); Forkel, *Geschichte der Musik*; and Edward William Lane, *Modern Egyptians* (London, 1842).

EGYPTIAN QUESTION, THE, was the outgrowth originally of the reckless extravagance of Ismail Pasha in his mania for internal reforms. Upon his accession, in 1863, the Egyptian debt was \$16,000,000; in 1879 it had risen to \$500,000,000. To meet this, and provide funds for his vast undertakings, in 1875 he sold 177,000 shares in the Suez Canal for \$20,000,000, and had also, at various times, negotiated loans with both English and French banking houses at exorbitant rates of interest. The condition of Egyptian finances became so hopelessly involved that several prominent English financiers were sent to Egypt to arrange a solvent system. In 1880, after many delays, a dual English and French control was established. Ismail had also promised a constitutional government, and failing to fulfill this, these European powers insisted upon his being deposed by the Sultan in favor of his son, Prince Tewfik, who was proclaimed Khedive in June, 1879. This latter intervention was based upon a sort of protection that England and France have exercised over the dynasty of Mehemet Ali since 1841. So much interference from foreign powers caused much discontent, and the result was a revolt, in 1882, headed by Arabi Pasha (q.v.). See also EGYPT. The Sultan had been urged without success to send troops to uphold the Khedive. He failed to do anything, and so English and French warships were sent for the purpose. Then came the massacre of Europeans in Alexandria, and the subsequent bombardment, in which the French hesitated to take part; neither did they co-operate with England in the re-adjustment of Egyptian affairs, and so, in 1883, the so-called dual control came to an end, in spite of the protests of France. Since this time, Egypt has been in everything but name a dependency of England, the French in the mean time trying to resume their share in its control, and sustained in their endeavors by Russia. They have even asked the Sultan to interfere and order the English from the country, but in August, 1891, a naval demonstration was made in the bay of Alexandria, as if to show that the English did not mean to discontinue the occupation.

EGYPTIAN VULTURE. See VULTURE.

EGYPTOLOGY. The study of the language, art, and antiquities of Egypt, especially of Ancient Egypt. One who engages in such study is technically known as an *Egyptologist*.

EHNINGER, JOHN WHETTON, born N. Y., 1827; a graduate of Columbia college, and pupil of Couture, the French painter. Among his works are "Portrait of Peter Stuyvesant;" a study from Irving's "Knickerbocker's History of New York;" "Love me, Love my Horse;" "The Sword;" "The Foray;" "Lady Jane Grey;" etchings for Hood's "Bridge of Sighs;" for Longfellow's "Miles Standish;" etc. D. 1889.

EH'RENBERG, CHRISTIAN GOTTFRIED, one of the most distinguished naturalists of Germany, was b. April 19, 1795, at Delitsch, in Prussian Saxony. Although he had been originally intended for the clerical profession, he early relinquished the study of theology in favor of medicine; and after having attended the classes at the medical faculty at Leipsic for two years, he removed in 1817 to Berlin, where he graduated in medicine in 1818. His favorite study at this period was botany, and his earliest publica-

tions are devoted to botanical subjects, and more especially to such as demand the use of the microscope—an instrument with which the name and reputation of E. must ever remain inseparably associated; for to him belongs the merit of having rescued it from the discredit into which it had fallen, and of having been one of the first fully to appreciate its capabilities. In 1820, E. accompanied his friend Hemprich on his travels to the east; and after having visited Egypt, Syria, and Arabia, returned, in 1826, to Berlin, where he was appointed to one of the medical chairs of the university, which he occupied until his death. The three years which intervened before he again set forth on a scientific expedition, were devoted to the arrangement and classification of some of the abundant materials which he had accumulated in his eastern travels; and to this period belong the composition of his *Akalephen des Rothen Meeres*—which has largely contributed towards our knowledge of the medusæ—and his *Symbolæ Physicæ*. In 1829, E. accompanied G. Rose and A. von Humboldt on an expedition to the Ural and Altai mountains, in the course of which he collected materials for his numerous memoirs on the Infusoria, and for his great work *Infusionsthierchen*, published at Leipsic in 1838, which have identified his name with the history and study of this department of animal life. E. divided the infusoria into rotatoria (now found to belong to higher orders of animal life) and polygastrica, which correspond more nearly with the infusoria as now admitted, although many of his polygastric organisms have been found to be vegetable structures, and some to be the larval forms of worms, etc. E.'s researches have not been confined to living organisms, but include fossil infusoria; and his great work, *Mikrogeologie*, on the application of the microscope to geology, contains the results of his investigation in this department of inquiry. E. was a member of most of the scientific bodies of Europe, and was for nearly fifty years an active contributor to the scientific literature of his country. He died Sept., 1876.

EHRENBREITSTEIN (Honor's Broad Stone), a t. and fortress of Rhenish Prussia, is picturesquely situated on the right bank of the Rhine, directly opposite Coblenz, with which it is connected by a bridge of boats. The town of E. has several mills, a tobacco-manufactory, a flourishing trade in wine, corn, and iron, two cattle-markets, and four annual fairs. Pop. '90, 5281. The fortress of E. occupies the summit of a precipitous rock 490 ft. high, and has been called the Gibraltar of the Rhine, on account of its great natural strength and its superior works. On three sides the fortress is so precipitous as to be perfectly inaccessible; on the fourth and only approachable side, the n. w., it is fortified by three successive lines of defenses, one within another. It is defended by 400 pieces of cannon; has cisterns capacious enough to hold a supply of water for three years, and a well sunk 400 ft. deep in the rock, and having communication with the Rhine. E. was besieged in vain by the French in 1688, but fell into their hands in 1799, after a siege of 14 months. Two years after, the French, on leaving E., at the peace of Luneville, blew up the works. It was assigned, however, to Prussia by the Congress of Vienna in 1814, and under that country was restored and thoroughly fortified, but it has ceased to be of importance as a fortress. It is capable of accommodating a garrison of 14,000 men, and provisions for 8,000 men for 10 years can be stowed in its vast magazines. The view from the fortress, which comprehends a considerable portion of the course of the Rhine, including its confluence with the Moselle, is picturesque in the highest degree.

EIBENSTOCK, a t. of the kingdom of Saxony, in the circle of Zwickau, and 16 m. s.s.e. from Zwickau. It stands in a high and bleak district. It has extensive manufactures of chemical products, muslins, lace, tobacco, and tinware, and a considerable trade in cattle. Medicinal plants are very extensively cultivated. Pop. '90, 7166.

EICHBERG, JULIUS, b. Germany, 1824; educated in the conservatory at Brussels; musical director in Germany and Switzerland. In 1856, he established a musical conservatory in Boston, Mass., where he was for several years teacher of music in the public schools. He has written *The Doctor of Alcantara*; *The Rose of Tyrol*; and other operas. He d. in 1893.

EICH HORN, JOHANN GOTTFRIED, one of the most distinguished scholars produced by Germany, was born at Dörnzimmern, in the principality of Hohenlohe-Oehringen, in 1752, and studied at Göttingen. He first became rector of the school of Ohrdruff, in the duchy of Gotha, afterwards, in 1775, professor of oriental languages in the university of Jena, and in 1788 removed to Göttingen in the like capacity. Of this university he continued a distinguished ornament till his death in 1827.

His scholarship was almost universal, and he has left numerous treatises on a multitude of subjects, both ancient and modern, classical and oriental, but he is chiefly known in this country as a Biblical critic, and a chief of what is called the rational school. E. examined the Scriptures from an anti-supernatural point of view, but applied to their elucidation and criticism an unrivaled knowledge of oriental and Biblical antiquities. Miraculous appearances recorded in the Bible are held by him to be explainable as natural events, and everything is to be brought to the test of reason. Rationalism in this form can hardly be said to exist now, even in Germany; but some of E.'s views as to the historical origin of the canonical gospels have been extensively adopted. His chief works on this subject are a *Universal Library of Biblical Literature* (*Allgemeine Bibliothek der Biblischen Literatur*, 10 vols., Leip. 1787-1801); an Intro-

duction to the Old Testament (*Einleitung in das Alte Testament*, 4th ed. 5 vols., Gött., 1824); an Introduction to the New Testament (*Einleitung in das Neue Testament*, 5 vols., Gött., 1824-27); and an Introduction to the Apocryphal Writings of the Old Testament (*Einleitung in die Apokryphischen Schriften des Alten Testaments*, Gött., 1798). In a work entitled *Primitive History (Urgeschichte)*, 2 vols., Nürnberg, 1790-93, he subjects the Pentateuch to bold criticism. His last work was a History of the House of Guelf, which he traces back to the 5th c. (*Urgeschichte des Hauses Welfen*, Han. 1817).

EICH STADT (earlier AICHSTÄDT, Lat. *Aureatum*, *Arborfelix*, or *Dryopolis*, the last signifying the same as Aichstädt—viz., Oak-town), a t. of Bavaria, is situated in a deep valley on the left bank of the Altmühl, about 40 m. w.s.w. of Regensburg, in lat. 48° 53' n., long. 11° 11' east. It consists of the town proper, with four suburbs, is well built, and has several fine squares, one of which is adorned with a fountain and a statue of St. Wilibald, the first bishop of Eichstadt. Among the notable buildings are the palace of the duke of Leuchtenberg, containing a museum of antiquities and some good portraits; the cathedral, founded in 1259, an imposing Gothic structure, with monuments in bronze and marble, good paintings, and fine painted glass; the town-house (1444), with a square tower; and the Wilibaldsburg, or castle of St. Wilibald, built on an eminence 1200 ft. high, and lately used as a barracks. The manufactures are woolen and cotton fabrics, ironmongery, and the preparation of lithographic stones obtained from quarries near by; there are also breweries, and several mills. Pop. '90, 7475. E. is of Roman origin, and in 908 was surrounded by walls. The bishopric of E. was founded as early as 745. E. came into the possession of Bavaria in 1805. In 1811, Eichstadt, along with the landgraviate of Leuchtenberg, was bestowed upon Eugène Beauharnais, duke of Leuchtenberg, but reverted to Bavaria in 1853.

EICHWALD, EDUARD, a Russian naturalist, was b. at Mitau, in Russia, 4th July, 1795, and studied the physical sciences and medicine at Berlin, 1814-17. After spending some years in travel, he returned to Russia, and in 1823 was appointed professor of zoology and midwifery at Kasan. In 1827, he accepted a call to Wilna as professor of zoology and comparative anatomy; and in 1838 he went to St. Petersburg as professor of mineralogy and zoology. E. was also a great traveler for scientific purposes; since he investigated the shores of the Caspian sea, the Caucasus, Persia, Germany, Switzerland, and France, traveled over the greater part of Russia, including the Scandinavian provinces, and in 1840 made a geological journey through Italy, Sicily, and Algeria. He has unquestionably been of more service to Russia by his geognostic, botanical, and zoological researches than any man since Pallas. His principal writings are *Zoologia Specialis* (Wilna, 1829-31), *Plantarum Novarum quas in Itinere Caspio-Caucas observavit, Fasciculi* (Wilna and Leip. 1831-33), *Travels to the Caspian Sea and the Caucasus* (Stuttg. (1834-37), *Memoir on the Mineral Riches of the Western Provinces of Russia* (Wilna, 1835), *Paleozoic Russia* (1840), and in 1851, *The Paleontology of Russia* (St. Petersburg, 1851). E. was a member of all the Russian, and of many foreign academies. He d. 1876.

EIDER, a river of n. Germany, forming the boundary-line between Schleswig on the n., and Holstein on the south. It rises 12 m. s.w. of Kiel, flows first n.w., then in a general westward direction, though with many windings, and enters the North sea at Tönning, its total length being 117 miles. It is navigable as far as Rendsburg, from which town the Schleswig-Holstein canal stretches e. to Kiel fiord, on the shore of the Baltic, thus establishing water-communication between the North and Baltic seas.

EIDER, or EIDER-DUCK (*somateria*), a genus of oceanic ducks, having the hind-toe furnished with a deep lobe, and the bill swollen and elevated at the base, and extending up the forehead, where it is divided down the middle by an elongated projection of feathers. The tertials are elongated, and fall down over the wing. This genus is further characterized by the very abundant development of a fine elastic gray down, particularly on the breast, the valuable *eider-down* of commerce.—The COMMON E. (*S. molleissima*) is intermediate in size between a common duck and a goose; not much exceeding the common duck in entire length, because of the comparative shortness of the neck, characteristic of the oceanic ducks, but being about twice its weight. The male is larger than the female; and in the breeding season, has the under parts black, the upper parts and the neck white, the crown of the head velvety black, the cheeks greenish white. After the breeding season, the white color almost disappears from the upper parts, and gives place to black, without change of feathers. The female is of a pale-brown color, tinged with red, and varied with transverse marks of dark brown. Young males at first resemble the females, and do not acquire the full adult plumage till their third winter. The young are termed brattocks in many parts of Scotland. The E. is an inhabitant of the northern parts of the world, abounding on arctic and subarctic shores, and becoming rarer in more southern and temperate regions. It is merely an occasional winter visitant in the middle latitudes of Europe, and the Fern islands are its most southern breeding-place on the British coast. In North America it seldom breeds further s. than the bay of Fundy. Great numbers breed on the coasts of Labrador and more northern parts of America, where hitherto the gathering of the down has been generally neglected; but in Iceland and Norway the breeding-grounds of eiders are carefully protected, and are transmitted as valuable inheritances from father to son. Cattle are sometimes removed from islets, in order to induce the eiders

to settle upon them, and a strict watch is kept against dogs and foxes. Promontories are sometimes even formed into artificial islets, on the same account, as the E., like many other sea-birds, prefers islands for its breeding-places, probably on account of their greater quiet and security. The nest is formed of fine sea-weeds, mosses, and dry twigs, if they are to be had, matted and interlaced. The eggs are usually five, sometimes six or seven in number, about 3 in. long, and fully 2 in. broad, of a uniform pale green: they are at first deposited without any down, but as incubation proceeds, the mother strips the down from her breast, and places it about them. By it they are kept warm when she at any time has occasion to leave them, but it seems to be indispensable to their being hatched; for if the eggs and down are removed, and if this is done a second time, so that the female cannot afford a further supply, the male comes and contributes for the third set of eggs the down of his breast, which is of a paler color. The common practice in Norway and Iceland is to take away the eggs and down twice, leaving the third set of eggs to increase the number of the species. The eiders of the Icelandic and Norwegian breeding-grounds show so little alarm at the approach of visitors that the females will permit themselves to be touched as they sit on their nests, the males moving about close beside them, but agitated and disturbed. The nests are often placed so close together that great care is necessary in walking among them to avoid trampling upon them. In the islet of Vidöe, a valuable breeding-ground near Reikiavik, the capital of Iceland, almost every little hollow place between the rocks is occupied by the nests of these fowls; they readily take possession of holes cut for them in rows in the sloping side of a hill; nay, garden-walls and the interiors of buildings are in like manner occupied. In Orkney and Shetland the E. is commonly known by the name of dunter-duck.

The E. is sometimes called **ST. CUTHBERT'S DUCK**, from a rock called St. Cuthbert's isle, one of the Fern islands. It seems probable that, with due care, the number of the eiders at the Fern islands, and some of the Scottish islands, might be greatly increased, and their down yield a considerable revenue; but at present their eggs are indiscriminately taken with those of other sea-birds, and no protection is extended to them. The eggs are remarkably fine. The flesh of the birds, also, is not unpleasant, and is said to become of superior excellence when they are partially domesticated, and when farinaceous food is mixed in considerable quantity with their natural diet of marine mollusks, crustaceans, etc. The complete domestication of the E. has been successfully attempted.

About half a pound of eider-down is said to be annually obtained from each nest, but this is reduced by cleaning to a quarter of a pound. The elasticity of the down is such that three quarters of an ounce of it will fill a large hat, although two or three pounds of it may be pressed into a ball and held in the hand. Its extensive use, particularly in Germany and other parts of the continent of Europe, for stuffing the bed-coverings, which there usually supply the place of blankets, etc., is well known. The down taken from birds which have been killed is inferior in quality to that obtained from the nests. The latter is known in commerce as *live down*, the former as *dead down*.

The **KING EIDER**, or **KING DUCK** (*S. spectabilis*), also yields no inconsiderable part of the eider-down of commerce, especially of that which is brought from the Danish settlements in Greenland. This bird belongs to still higher northern latitudes than the common eider. On some parts of the coasts of Greenland, on those of Spitzbergen, Nova Zembla, the North Georgian islands, etc., it occurs in great numbers. A few breed in Iceland and the Faröe islands. In Britain, the bird is a rare visitant. It is of about the same size as the common eider. The female is very similar to the female of that species; but the male has a remarkable large protuberance over the base of the upper mandible, and the white color of the neck extends only over the upper part of the back.

EIFFEL, THE, is a bleak and barren plateau situated in the extreme southwestern part of Prussia. It is bounded on the west by Belgium, and on the other three sides by the rivers Roer, Rhine, and Moselle. Its elevation averages from 1500 to 2000 feet, and is diversified by depressions and ridges that show plainly its volcanic origin, which, as it approaches the rivers, become wooded and rocky ravines. The plateau belongs to the Devonian formation, and the volcanic irruptions have brought near the surface in some portions a limestone that is particularly rich in fossils. Above this in some parts is found another formation, containing considerable quantities of zinc and lead. The soil is so poor that it is but little cultivated, and above 1700 feet the climate is so raw and bleak that little grows beside heather.

EIFFEL, GUSTAVE, engineer, was born at Dijon, France, in 1832; studied at the École Centrale; and in 1858 constructed the iron bridge over the Garonne at Bordeaux, and later that over the Douro at Oporto; also the remarkable viaducts of Garabet in Contal, and of Montuçon; the designs for the locks of the Panama canal; the framework on which Bartholdi's statue of "Liberty Enlightening the World" was built; and the celebrated Eiffel tower (q.v.), on the completion of which he was made an officer of the Legion of Honor. In 1893 he was sentenced to fine and imprisonment for complicity in the Panama canal frauds.

EIFFEL TOWER, THE, the colossal structure erected in the Champs de Mars at Paris by the famous engineer, Gustave Eiffel, from whom it derives its name, was completed

March 31, 1889, in time to serve as one of the notable features of the exposition of that year. It contains three stories, reached by a series of elevators; and the platform at the top is at a distance of 985 feet from the ground. In its construction nearly 7000 tons of iron were used; and the cost was estimated at nearly \$980,000, of which about \$292,000 was voted by the government, while the remainder was supplied by M. Eiffel, who trusted for his reimbursement to the receipts from admission fees during the twenty years for which he is entitled to the profits from the tower. The profits for the year 1889 alone nearly paid for the cost of the tower.

EIGHT, PIECE OF, a name once popularly given to the Spanish dollar, as being divided into 8 reals.

EIGHT-HOUR LAW, an act adopted by the U. S. congress in 1868, and subsequently by the legislatures of a number of the states, providing that in all government employment eight hours shall constitute a day's work. It was expected that this would have an influence on the practice in private employment. However desirable this result, the expectation has as yet been realized in only a small degree, as the labor-market seems to develop its own laws in its own time and way.

EIKON BASILIKÉ, a work presumed to have been written by Charles I. during his confinement, but now more correctly imputed to another writer. The following are the explanations of M. Guizot on the subject, in his *History of Oliver Cromwell and the English Commonwealth*: "It is to the *Eikon Basiliké* that Charles I. is principally indebted for the name of the royal martyr. The work is not by him; external testimony and internal evidence both combine to remove all doubt on the matter. Dr. Gauden, bishop, first of Exeter and afterwards of Worcester, under the reign of Charles II., was its real author; but the manuscript had probably been perused and approved, perhaps even corrected, by Charles himself during his residence in the Isle of Wight. In any case, it was the real expression and true portraiture of his position, character, and mind, as they had been formed by misfortune; it is remarkable for an elevation of thought which is at once natural and strained; a constant mingling of blind royal pride and sincere Christian humility; heart-impulses struggling against habits of obstinate self-consciousness; true piety in the midst of misguided conduct; invincible, though somewhat inert devotion to his faith, his honor, and his rank; and as all these sentiments are expressed in monotonous language, which, though often emphatic, is always grave, tranquil, and even unctuous, with serenity and sadness, it is not surprising that such a work should have profoundly affected all royalist hearts, and easily persuaded them that it was the king himself who addressed them." See GAUDEN, JOHN.

EIKONOKLASTES (*Iconoclastes*, "Image-Breaker"). A famous work written by John Milton (q.v.), Oct. 1649, in answer to the *Eikon Basiliké* (Royal Image), usually credited to Charles I. of England. An enlarged edition was published in 1650, which, with other works, called attention to the Commonwealth (q.v.) and to Milton himself, so that it came near causing his execution.

EILDON HILLS, three peaks in Roxburghshire, Scotland, near the romantic village of Melrose, commanding a view of the splendid scenery of the region. The story is that the renowned wizard, Michael Scot, found but one mountain there but divided it into three peaks. None of them are over 1400 ft. in height.

EILENBURG, a t. of Prussian Saxony, is situated on an island of the river Mulde, 26 m. e.n.e. of Merseburg. It is reached by two bridges, is surrounded by walls and ditches, and consists of the town proper with four suburbs. The manufactures of E. consist of calico, woolen yarn, tobacco, chemicals, beer, and agricultural implements. Pop. '90, 12,477.

EILETHY IA, a city of Egypt, anciently Nuben, and known at present by the name of El Kab. The town was anciently walled. The present ruins consist of the remains of small temples dedicated by Rameses II. to Ra; a Ptolemaic temple dedicated to the Eponymous goddess by Physcon or Euergetes II., with additions by Ptolemy Alexander I., and Cleopatra; and another temple dedicated by Amenophis III. to the local deities. The names of other monarchs are also found in the ruins; but the most interesting and important remains are the rock-tombs excavated in the vicinity. That of Aahmes-Pensuben, a functionary, records his military services in the wars of the early monarchs of the 18th dynasty against the Shos or shepherds, and other Asiatic and Nigritic races. Another, of Pahari, is decorated with paintings representing the pursuits of agriculture. Swine were sacred to the local goddess. The town itself, during the 18th dynasty, appears to have been governed by princes, and some of the tombs appear as late as the 19th and 20th dynasties.—Wilkinson, *Modern Egypt*, vol. ii. p. 270; Champollion, *Notice Descriptive*, p. 265; Brugsch, *Reiseberichte aus Aegypten*, p. 214.

EIMBECK, or **EINBECK**, an old t. of Hanover, is situated on the Ilme, 40 m. s.s.e. from Hanover, in lat. 51° 49' n., long. 9° 50' east. It was a place of considerable importance in the 15th c., and was a Hanse city, but has decayed greatly in recent times. The minster is large and beautiful. The houses of E. are antiquated; its streets narrow, tortuous, and badly paved. Pop. '90, 7676.

EINSIEDELN, a small t. of Switzerland in the canton of Schwyz and 9 m. n.n.e. of the town of that name. It is worthy of mention on account of its Benedictine abbey, containing a black image of the Virgin, to which about 200,000 pilgrims annually repair. The town has many inns and alehouses, supported chiefly by the pilgrims. The dedication

festival of the abbey, 14th Sept., is the great pilgrimage season. The present abbey, one of the finest in Switzerland, was built at the beginning of the 18th c., and is the fifth since the foundation of the abbey, in the 10th century. Its treasury was rifled by the French in 1798. Pop. '88, 8512.

EIRE, EYRE, JUSTICES IN (corruption of Lat. *in itinere*). By this term, both in England and Scotland, were the judges of assize (q.v.) formerly designated. Justices in eire were first established in England by the statute of Northampton (1176 A.D.), in the reign of Henry II. At first, they made the circuit of the kingdom once in seven years; but by Magna Charta, c. 12, the chief justices are directed to send justices through every county once in the year. In Scotland, the chief justiciar, says Erskine, i. 3, s. 25, was originally bound to hold yearly two justice courts or aires at Edinburgh and Peebles. This court gradually became fixed at Edinburgh. Besides this court, special "justice aires" were frequently held in the more remote parts of the country by the king in person, or by judges named by him, twice in the year, in spring and autumn (st. Robert III. c. 30, 1440 c. 5, 1491 c. 29). These courts were discontinued, but revived by 1587, c. 81. The term is still in use in Scotland, where, at the commencement of every circuit, proclamation is made to the lieges to attend the "circuit eire."

EISENACH, a t. of Germany, Saxe Weimar, is beautifully situated amid finely wooded hills on the Hörsel, 45 m. w. from Weimar. Once the capital of a principality to which it gave name, E. is still a prosperous and industrious town, and is well built, with wide, clean, and well-paved streets. E. has a ducal palace, a large and handsome building, now used as a court-house; a spacious market-place, including a handsome civic school; numerous churches; and a school of design. Its manufactures are woolen, cotton, and linen goods, soap, white lead, meerscham pipe-bowls, leather, and carpets; there are also breweries and tanneries, and oil, powder, and spinning mills. Pop. '90, 21,399.

On a lofty eminence in the immediate vicinity, surrounded by forests, stands the castle of Wartburg, now used as a prison, but formerly a residence of the landgraves of Thuringia, and worthy of notice as the spot where the Minnesingers (q.v.) assembled to hold a trial of skill in 1207, but chiefly as being the asylum to which Luther, at a time of great danger, was carried by his friend the elector of Saxony, who, waylaying the great reformer, seized him, with an appearance of violence, and hurried him to this fastness, where he remained in safety from May, 1521, to Mar., 1522. The chapel in which Luther preached, as well as the chamber which he inhabited, and in which he discomfited the evil one by throwing the inkstand at his head, is still pointed out. Another portion of the castle contains a fine armory, with suits of the 16th and 17th, and even, it is said, of the 13th and 14th centuries.

EISENBERG (Ger., Iron Mountain), a small t. of Germany, in the duchy of Saxe-Altenburg, is situated on an eminence near the Saale, 26 m. e. of Weimar. It is well built, its chief edifices being the castle, the observatory, the lyceum, and the town-house. E. has manufactures of woollens, porcelain, and earthenware, and has annual fairs. Pop. '90, 7349.

EISENBURG, or VAS VARMEGYE, a co. in w. Hungary, on the border of Styria; 1945 sq. m.; pop. '90, 389,854. It is mountainous, fertile, and well watered. The productions are coal, mineral waters, quicksilver, corn, wine, fruit, and tobacco. Chief town, Szembathely, or Stein-am-Anger.

EISENERZ, a small t. of Austria, in the n. of the province of Styria, 20 m. w.n.w. of Bruck. Its appearance is dirty and unprepossessing, and it is worthy of mention only for its connection with the Erzberg (ore mountain), at the southern base of which the town lies. This mountain, which is about 2,840 ft. high, and about 5 m. in circumference at the base, is literally a solid mass of iron ore, of a quality so rich, that, instead of cutting mines into it and following the metal in veins—which process was formerly adopted here—the top and sides of the rock are quarried from the outside, and the ore is then broken small, and conveyed to the smelting-house without further preparation. Mines have been worked on this mountain for upwards of 1000 years. Arragonite (*eisenblüte*, or *flos ferri*), resembling branching coral in form, and of the most beautiful and purest white, is found in grottoes in the interior of the mountain. Nowhere else does it occur in equal perfection. Pop. 1890, 2433.

EISENSTADT, a free t. of e. Hungary, stands in lat. 47° 50' n., and long. 16° 30' e., 12 m. n.n.w. of Oedenburg. It is a walled town, has two gates, and consists principally of three main streets. It has also a Franciscan monastery, containing the burial-vault of the Esterhazy family, who are the proprietors of the palace, which forms the chief architectural feature of Eisenstadt. This palace was built in 1683, but was altered and enlarged in 1805. It contains 200 chambers for guests, and has a saloon sufficiently large to dine 1000 people. Its library contains a magnificent collection of church-music—masses, litanies, oratorios, etc., with some of Handel's MSS. In the suburbs is a conservatory, one of the largest in Europe, containing 70,000 specimens of exotic plants. Pop. '90, 2972.

EISLE'BEN, a t. of Prussian Saxony, is situated about 20 m. w. of Halle. E., once capital of the counts of Mansfeld, is the centre of a rich mining district, and consists of old town, new town, and suburbs. E. makes large quantities of beer, and has manufactories of potash and tobacco; in the vicinity are copper and silver mines, producing yearly about 1000 tons of copper, and 25 tons of silver. Pop. '90, 23,903. Here, on Nov. 10, 1483, Luther was born, and here also he died, Feb. 16, 1546. The house in which he was born was partially consumed by fire in 1689. An interesting remnant of it, however, is still extant, having the portrait of Luther placed over the entrance. In the church of St. Andrew are the cap, cloak, and other relics of the great reformer, and the city contains a bronze statue of him, erected in 1883.

EISTEDDFOD, the name given to a gathering of Welsh bards and musicians for competition in national minstrelsy, and for the preservation and cultivation of the national poetry and music. In 1887 the regular meeting was held in London, and in 1890 Queen Elizabeth, of Roumania (Carmen Silva), was the chief guest. Eisteddfods are frequently held in the United States. See **BARD**, and **WELSH LANGUAGE AND LITERATURE**.

EJECTMENT, ACTION OF, an action brought to recover possession of land, and also to obtain damages for its being wrongfully withheld from the person who brings the suit. This, in the common law practice, is the only surviving instance of a mixed action; that is, one partaking in part the nature of a real action, in part that of a personal action. The process of establishing title to real estate by this action was formerly—and still is, in a few of the states in this country—a most intricate and serious one. It was carried on by a series of legal fictions, and it is interesting to examine this process as the best possible illustration of the use in law of fictions. The action took the place of a former strictly personal action of ejectment. Such an action was brought, not to recover the title of land itself, but by the lessee to recover damages for the injury sustained on account of being deprived of the use of the land for a certain term. To maintain such an action the plaintiff was obliged to show: 1, good title in the owner alleged; 2, a lease by him; 3, entry on the land by his lessee; 4, ouster from the land. But as, when it was desired to test the question of title, this state of facts very likely might not exist, and as common law procedure had provided no other way of testing the title, a series of fictions was introduced into the case. It was alleged, let us say, that A, the plaintiff who claims title to the land, had entered upon it and had made a lease to an imaginary person, John Doe; that John Doe had possession, but had been ousted therefrom by another fictitious person, Richard Roe; and that finally Richard Roe claimed his right of possession as tenant from B, the real defendant, whose title A wished to impugn. It was not necessary that actual entry should have been made by A, and a lease given to John Doe, as above; that part of the transaction might also be fictitious. The method of proceeding was to notify B, or any actual tenant of B's in possession, that his alleged tenant, Richard Roe, had been sued; that Roe was what was called a "casual ejector," that he would make no defence, and that B must, therefore, appear to defend his own title. When by this elaborate and ingenious method the real tenant or owner was brought into court, the fictitious legal machinery which had been used for that purpose was cast aside by the simple process of refusing to allow such a defendant to appear in the case until he had confessed formally the alleged fictitious lease and other proceedings between John Doe and Richard Roe. Thus the question of the possession by a lessee, the ostensible cause of the action, was thrown out, and the only issue remaining to be tried was that of title. An amusing account of the absurdities that might be involved in such a process was given in the novel called "Ten Thousand a Year," by Dr. Warren. In England this form of action of ejectment was abolished in 1852, though the name was still retained. By the Judicature Acts of 1875 actions for the recovery of land were placed on the same footing as other actions, and what had been retained of the old common law action was superseded by a simple and uniform method. Legislation to a similar effect has been adopted in several of the states in this country; in others the action of ejectment is maintained in much the same condition in which it was left after the English act of 1852; in a very few others the ancient form is still in use. The remedy given by an action of ejectment is one that may be used for the recovery only of corporeal property, not of incorporeal hereditaments, such as an easement or a dower right; nor will such an action lie to recover personal property. An action of ejectment may be brought by any one who has the legal right to enter and possess the land without regard to the exact character of his estate therein; and any person may be made defendant who has wrongfully seized or held the property under a claim of right against one holding a lawful estate therein. The burden of proof of title lies with the plaintiff, the presumption of law being in favor of the actual possessor, who need not, therefore, prove his own title otherwise than against the plaintiff. The verdict in an ejectment suit is for the plaintiff to recover peaceable possession of the land, or for the defendant to retain his possession. Under the old practice the damages which might be given to the plaintiff, together with possession, were purely nominal; a supplementary suit might be brought if substantial damages were really demanded. But under the later English practice, and certainly in several of our states, substantial damages may be granted on the original trial. Such damages may also be in the nature of an accounting for mesne, or intermediate profits.

EJOO. See GOMUTO.

EKATERINBURG, a fortified t. of Russia, in the province of Perm, is situated on the eastern slope of the Ural mountains, on both banks of the Isset, in lat. $56^{\circ} 50' \text{ n.}$, long. $60^{\circ} 7' \text{ e.}$ The majority of the houses are of wood, but there are also many very handsome stone buildings. In the southern portion of the town, which is connected with the northern by a fine bridge, are the government magazines, the mills, factories, and the market-place. The opposite side, however, is the handsomer. It contains the dwellings of the mine proprietors and of the merchants, and is laid out in elegant and spacious streets. E. is the seat of administration for the Ural mines, and is in the center of the mining districts of these mountains. Among its institutions, it has a museum of mineralogy, an excellent chemical laboratory, a school for educating miners, an imperial mint, numerous works for cleansing and amalgamating metals, and for cutting and polishing precious stones. The greater number of the inhabitants are supported by the productiveness of the neighboring mines. E. stands on the high-road between Russia and Siberia, and is therefore a place of brisk trade. In the vicinity are the gold mines of Niviansk and Beresoff. Pop. '92, 36,825. E. was founded by Peter the Great in 1723. Its average temperature during the year is $31^{\circ} 9'$.

EKATERINODAR, a t. of Russia, and capital of the country of the Cossacks of the Black sea, is situated on the right bank of the river Kuban, about 100 m. from its mouth, in lat. $45^{\circ} 5' \text{ n.}$, long. 39° east. It is surrounded on all sides by swamp and morass. Its houses are almost all of earth, have thatched roofs, and are of one story in height. The streets are broad, regular, and straight, but exceedingly dirty. Pop. '92, 77,060.

EKATERINOGRAD, a t. and fortress in the s. of Russia, in the government of Caucasus, is situated on the left bank of the Terek, in lat. $43^{\circ} 40' \text{ n.}$, and long. $44^{\circ} 3' \text{ e.}$ It is an important military post of the Cossacks; its houses are regular, but miserably built. A stone triumphal arch was erected at E. by Catharine II., in memory of prince Potemkin, who founded the town in 1777.

EKATERINOSLAV, a government of Russia, in the province of South Russia, bounded on the n. by Little Russia, and on the s. reaching in one part to the shores of the sea of Azov. The government of E., together with that isolated portion of it which lies on the eastern border of the sea of Azov, and comprises the district of Taganrog and the country of the Azovian Cossacks, has, in all, an area of 26,148 sq. m., and in 1892 had 1,676,563 inhabitants. The greater part of the area is an undulating steppe, or plain, which slopes gradually towards the south. The province is watered by the Dnieper, Don, Donets, and their affluents, some of which are navigable. In the east are extensive veins of coal and other ores, and the province is an important mining centre. There are deposits of fireproof clay, clay for earthenware, and gypsum. The climate is mild and a great many highly esteemed fruits, such as apricots, peaches, cherries, etc., which do not occur in the more northern parts of Russia, are found here. A large part of the soil is cultivated and fertile, and the chief source of wealth is the raising of wheat. There are also extensive orchards, and large numbers of cattle and sheep are raised. At the mouth of the Don are valuable fisheries. Only a small portion of the province is covered with forests. Russians began to people the province toward the end of the 18th century, but since that time it has developed into one of the most populous of the governments. The bulk of the population is Little-Russian, but it includes Greeks, Jews, Germans, and Armenians.

EKATERINOSLAV, a fortified t. of South Russia, is situated on the right bank of the Dnieper, 250 m. n.e. from Odessa, in lat. $48^{\circ} 27' \text{ n.}$, long. $35^{\circ} 5' \text{ east.}$ It was founded in 1787 by the empress Catharine II. E. has manufactures of silk and woolen goods, and an important annual wool-fair. It is the residence of an archbishop. In the vicinity is a palace, now in a ruinous condition, formerly the residence of prince Potemkin. Pop. '92, 83,736.

EKERÖE. One of the Aland Islands, in the Gulf of Bothnia, west of Aland, and about 12 m. in length.

EKHMIM, or AKHMIM, a t. of Upper Egypt, 53 m. s.s.e. from Siout, on the right bank of the Nile, and about a quarter of a mile from it. It occupies the site of the ancient *Chemmis*, or *Panopolis*, one of the great cities of the Thebaid. Remains of ancient buildings exist. Cotton fabrics are manufactured here. Pop. supposed to be about 18,800.

EKRON, the most northerly of the five cities of the Philistines. It was assigned to Judah, but afterwards given to Dan. Before the monarchy it again came under the rule of the Philistines. It was the last place to which the captured ark of the covenant was taken by the Philistines, before its restoration to the Israelites. After David's victory over Goliath, the Philistines were pursued as far as this place. The name occurs in cuneiform inscriptions and on Syrian monuments. The site has been recognized in Akir, a Moslem village 5 m. s.w. of Ramleh. It has a dreary and forsaken appearance.

ELÆAGNUS, a genus of exogenous plants, of the natural order *elagnaceæ*. This order consists of trees and shrubs, usually covered with scurfy scales, and having alternate or opposite entire leaves, without stipules. There are only about thirty known species of this order, all natives of the northern hemisphere, but found both in its warm and cold regions. The sallowthorn (q.v.) is the only British species. *Shepherdia argentea*, a North American shrub of this order, yields a pleasant fruit. The genus *elæagnus* consists of a number of deciduous shrubs or low trees, with male and female flowers on the same plant. *E. angustifolia*, the OLEASTER, sometimes called wild olive, is a native of the s. of Europe and the Levant, a spiny tree of 15 to 20 ft. in height, with lanceolate leaves, which, as well as the young shoots, are hoary with stellate hairs. It is frequently planted in England, for the sake of its silvery white foliage, beautifully contrasting with the green of other trees, and its very fragrant flowers, which are small and of a dull yellow color.

ELÆIS. See OIL PALM.

ELÆOCARPACEÆ, according to some botanists, a natural order of exogenous plants, but regarded by others as merely a sub-order of *tiliaceæ*; the chief distinctions being deeply cut or fringed petals and anthers opening at the apex. The E. are mostly East Indian trees. The fruits of some are eaten; those of some are dried and put into curries; those of *elæocarpus serratus* are pickled in brine and eaten with oil in Ceylon, and much resemble olives. *E. cyaneus*, a native of New Holland, is here figured. The deeply wrinkled seed or stone of the fruit of some, particularly *elæocarpus ganitrus* and *monocera tuberculata*, being very hard, and having a fine sculptured appearance, are made into beads for necklaces and bracelets, and are sometimes set in gold. They are often called OLIVE NUTS. These beads are frequently worn by religious devotees in India, and are sometimes sold as ornaments in the shops of Europe.

ELÆOCOC'CA, a genus of *euphorbiaceæ*, the seeds of some of which yield useful oils. The oil obtained from *E. verrucosa* is used for food in Japan, notwithstanding considerable acidity. The tree is cultivated in the Mauritius, and the oil is there used only for burning. That obtained from *E. vernicia* is used in painting in China.

ELÆODENDRON, a genus of trees of the natural order *celastraceæ*, having a 5-partite calyx, 5 petals, a 5-angled disk, 5 stamens, the ovary immersed in the disk, and a drupaceous fruit. *E. glaucum*, a native of Ceylon and the s. of India, is sometimes called the *Ceylon tea-tree*, from the resemblance of its leaves to those of the tea-shrub. The timber of *E. croceum*, called SAFFRONWOOD at the cape of Good Hope, is much used there in building and cabinet-making; it is fine-grained, hard, and tough. The fruit of *E. kuba*, another South African species, is eaten by the colonists. That of *E. argan* yields an oil similar to olive oil, much used by the Moors.

ELAGAB'ALUS, or HELIOGABALUS, emperor of Rome, was b. at Emesa in 204 A.D. His real name was Varius Avitus Bassianus, but having, when a mere child, been appointed high-priest of the Syro-Phœnician sun-god Elagabal, he assumed the name of that deity. Soon after the death of his cousin Caracalla, E. was proclaimed emperor by the soldiers, in opposition to the legitimate sovereign, Macrinus, who had become obnoxious to the troops from the severity of his discipline. The rivals met in battle at Antioch in 218 A.D. Macrinus was defeated, and E. quietly assumed the purple. His reign, which lasted rather more than three years and nine months, was infamous for nearly unparalleled debaucheries of every kind in which he indulged. He was murdered in an insurrection of the prætorians in 222 A.D., and was succeeded by his cousin and adopted son, Alexander Severus.

ELA'IN. See OLEINE.

ELAM, or SUSIANA, an ancient name of the mountainous district e. of Babylonia, stretching from India to the Persian gulf, including a low tract of fertile land in which are the marshes around the mouths of the Tigris and Euphrates. Its inhabitants were mostly nomadic. In certain portions it produces large quantities of grain. The chief city and capital was Shusan, or Susa.

ELAND, *Antilope oreas*, a species of antelope, abounding in s. Africa, wherever there are fertile plains and low hills, except in the longest settled and most cultivated parts of Cape Colony, where it has been too much hunted to be any longer of very frequent occurrence. It is described by Livingstone as "the most magnificent of all antelopes." It is one of those which are sometimes called *bovine* antelopes, because they seem to approximate a little in some of their characters to the ox-tribe, having a broader muzzle, less slender limbs, and greater bulkiness of form than the antelopes in general. The E., however, is a very graceful and beautiful animal; it is as large as a horse, fully 5 ft. in height at the shoulder, and weighs from 7 to 9 cwt. The horns—which in the male are about a foot and a half long, and in the female longer and more slender—are almost straight, inclining backwards and outwards; they are pointed, and their great strength is increased by a spiral wreath. The E. has a large protuberance on the larynx, in this resembling the elk, from which, probably on this account, it has derived its name. It is also known as the *impoof* or *impoofoo*. Its tail very much resembles that of an ox, and terminates in a tuft of long black hair. It is a gregarious animal, and the

herds are often large. It is generally very fat, and not difficult of pursuit, its gentleness also increasing the facilities of the hunter. Its flesh is very much esteemed, particularly the muscles of the thighs, which are dried like tongues. It is surprising that no attempt has been made to domesticate, for useful purposes, an animal possessing so many valuable qualities. See *illus.*, ANTELOPES, vol. I.

Livingstone discovered a variety of the E. in regions to the n. of the Cape Colony, having the body marked with narrow white transverse bands. According to the figure given in his travels, it seems even more bovine in form than the common variety.

E'LANET, *Elanus*, a genus of *falconidae*, allied to the kites, which they resemble in many of their characters; but from which they differ in having the short tarsi half covered with feathers, and the claws, except that of the middle toe, rounded beneath. The tail is very little forked. One species (*E. melanopterus*) is common in Africa, from Egypt to the cape of Good Hope, and is found also in India. Another species is the black-shouldered hawk (*E. dispar*) of America, the northern limit of which appears to be South Carolina. Both of these feed chiefly on insects, which they catch on the wing, but they also prey on small birds and reptiles.

ELASTIC CURVE, according to James Bérnoulli, the figure which would be taken by a thin horizontal elastic plate if one end was fixed and the other loaded with weights.

ELAPS, a genus of venomous serpents, inhabiting the warm parts of the world, and chiefly the Indian islands, New Holland, and tropical America. They are of slender and cylindrical form, with an elongated head, and often of bright and beautiful colors. They are not very agile, are said to prey chiefly on other reptiles, and live among the luxuriant vegetation of meadows or of forests.

EL-ARA'BAH is the name of the great depression of country which extends from the Dead sea to the gulf of Akabah. From the foot of Mt. Hermon to the Elanitic gulf of the Red sea there is a deep valley that is classed by geographers among the most remarkable depressions on the globe. It is divided by a line of chalk cliffs, which cross it about 6 m. s. of the Dead sea. North of these the valley, at the present day, is named El-Ghor (q.v.); s. of them the old Hebrew name El-Arabah is retained. The whole length of this part is about 100 miles. Its greatest width, 60 m. n. of the gulf of Akabah, is from 10 to 12 m.; its least at the gulf, not more than 3 or 4 miles. On the *western* side are the horizontal lines of the Tih, white and desolate, mounting up 1500 or 1800 ft. from the valley by huge steps, with level barren tracts on their tops, and crowned by the plateau of "the wilderness of the wanderings." This range has two principal passes; one, very steep and difficult, is close to the gulf, and is known simply as "the pass." Through it the Mecca pilgrims climb. The other, on the road from Petra to Hebron and leading up from the plateau to a level 1000 ft. higher, is probably the point at which the Israelites, when attempting against the divine command to "go up" into the promised land, were repulsed by the Amalekites coming down from the hill. On the *eastern* side are the mountains of Edom, which rise to a height of more than 2,000 ft., and are crowned by Mt. Hor, 5,600 ft. high. These mountains are verdant, and in many parts cultivated, yielding good crops. Ruined towns and villages abound, attesting the former prosperity of the country. The numerous wadys, which come down from the mountains, generally contain streams sufficient to keep vegetation alive. One of these begins near the Akabah, leading by the back of the range to Petra, and thence to the Dead sea. Along it there are traces of a Roman road. Another gives the most direct access from El-A. to Petra. After the discovery that a prolonged depression exists from Mt. Hermon to the Red sea many persons naturally assumed that the Jordan formerly flowed through its whole extent. But this theory is sufficiently disproved by the levels, imperfect as they are, which have lately been taken of the Jordan and the Dead sea. These have been found to be below the level of the gulf of Akabah and the drainage of the northern portion of El-A. is into the Dead sea, and that of the southern portion into the gulf. A ship canal is proposed from the gulf to the Mediterranean.

EL-ARAISH, or L'ARAISH (Fr. Larache), a t. in Morocco, on the Atlantic ocean, 45 m. s. of Tangier, well situated on a rocky height, and the seat of a military governor. It is one of the most frequented ports on that part of the coast. Pop. about 5000.

ELASMOSAU'RIANS, gigantic marine saurians of the cretaceous epoch. One species had vertebræ nearly as large as those of an elephant. It was like a whale in bulk, with a long flexible neck, paddles short, tail serpent-like, skull light with a long flat muzzle with nostrils or spout-holes near the orbits, teeth sharp and well fitted for seizing fish. It reached 45 ft. in length. Its remains have been found especially in New Jersey.

ELASTICITY, or **SPRING**. When an external force acts upon a solid body, it produces at first slight alterations in the relative positions of the particles; and if before these alterations exceed a certain limit, the force ceases to act, the particles return to their former position, and the disfigurement disappears. This power or property of recovering their previous form after alteration, is called E., and we are justified in ascribing it to all bodies, though in very different degrees. It was once believed that there were definite limits within which changes of form produced by pressure or other

forces disappeared completely. It was thought, for instance, that when a weight of no great magnitude is suspended from a metallic wire, the slight increase of length which the wire is observed to undergo, is completely lost when the weight is removed; and the limit to which the wire might thus be stretched, and still suffer no permanent increase of length, was called the limit of its elasticity. But recent more accurate experiments have shown that no such limits exist, at least in the case of metals; or, which is the same thing, that permanent lengthening results, however slightly the wire be loaded—it never contracts again quite so far as it was stretched. It is necessary, therefore, to fix the limit arbitrarily; and this is done by agreeing that it shall be held to begin when the metal in question suffers a permanent elongation of 0.00005 of its length. To get the elastic extensibility of a wire, then, we must compare its length suspended, with its length when the weight is removed. In this way it is found that the extensions produced are proportional to the extending forces or weights. From this law, then, we can calculate what weight it would require to stretch a wire or rod of a sq. in. in section to double its own length; supposing it possible to proceed so far without breaking it, and that the law of E. continued up to this point unaltered. This weight, which is different for every metal or kind of wood, is called the *co-efficient* or *modulus of elasticity* of the particular substance; and is used in mechanics in calculating how far a given weight will extend a wire or rod of given diameter. This co-efficient is not constant for the same metal; for all circumstances that increase the density of the metal, increase the modulus of elasticity. Bodies manifest E., not only when extended in length, but also when compressed, when bent, or when twisted. If an ivory ball be dropped from a height upon a marble slab smeared with fat and lampblack, when caught after the rebound, it is seen to have touched the marble, not in a point, but in a circle of several lines in diameter; and must therefore have lost for a time its spherical shape over that extent. In the same way the mark of a well-hit golf-ball is pretty broadly shown upon the face of a club after the stroke. The E. shown by wires and threads of glass when twisted, has been turned to account in the torsion-balance (q.v.), for measuring other weak forces. Steel, ivory, caoutchouc, etc., are well known for their elastic properties, to which they owe much of their utility.

The propagation of waves of sound through solid bodies depends upon their E.; and from observations of this kind made with different substances, the modulus of E. for each may be deduced; the results, however, differ slightly from those arrived at by attaching weights, owing to the heat produced by the vibratory movement.

All solid bodies are only imperfectly elastic—that is, they do not quite recover their form and volume when the disturbing force ceases. Liquids and gases, on the contrary, are perfectly elastic, or return exactly to their original bulk or volume when the pressure is removed. The elasticity of liquids and gases, however, acts only in expanding after compression, while that of solids acts also in contracting after extension. The expansive elasticity of liquids and gases is equal to the force used to compress them. Water and other liquids are easily seen to be compressible, by the fact of their conveying sound—a sound-wave being merely a *state* of compression, propagated from each layer of the liquid to the next. The coefficient of elasticity of water determined by Colladon and Sturm, from the velocity of sound in the lake of Geneva, agrees very well with that determined by direct measurements in Oerstedt's apparatus. The discovery of the compressibility of water is an English one, due to Canton, in 1762. Previous attempts, by Italian and Dutch philosophers, to compress water by hammering a silver shell filled with that fluid, had failed to give any certain result, as the water was forced through the pores of the metal. At a temperature of 50°, one atmosphere compresses water to about 0.999995 of its volume. From the existence of a maximum density temperature for water, some curious consequences arise with regard to the effects of pressure on the fluid. The volumes or bulks which a given quantity of any gas assumes under different pressures, are nearly in inverse proportion to the pressures. See **MARIOTTE'S LAW**. The elasticity of gases is usually measured by the height of the column of mercury that they sustain. The elasticity of gases is a force much and variously employed in the arts of life. See **AIR-GUN**, **AIR-PUMP**, **GUNPOWDER**, etc.

ELASTIC TISSUE, known also as yellow fibrous tissue, is one of the forms of fibrous tissue. It derives its name from the remarkable physical property which it possesses of permitting its fibers to be drawn out to double their length, and again returning to their original length. It occurs in various ligamentous and other structures of the animal body in which elasticity is required, as, for example, in the vocal cords, the membranes connecting the cartilaginous rings of the trachea, the middle coat of the arteries, the skin, etc.

ELATEA (anc. CITHÆRON), a mountain range in Greece, between Bœotia and Attica, frequently mentioned by the early poets. The highest peak is a little over 4600 ft. above sea-level.

EL'ATER, a Linnæan genus of coleopterous insects, now divided into many genera, and forming the tribe or family *elateridae*. They have a narrow elongated body; the head is in almost all cases inserted deeply into the thorax; a strong spine on the under part of the thorax at its base, fits into a groove; the legs are short, and rather slender.

They are generally found upon the flowers and leaves of plants, which are their food. When disturbed, they fold their legs and antennæ close to the body, and let themselves drop to the ground. If they fall on their back, or are placed on it, the shortness of their legs incapacitates them for obtaining another position by the means common to other insects; but they are enabled to do so by a violent muscular exertion, arching the body a little, and suddenly straightening it again, so that they fling themselves into the air with a jerk and a *click*. Hence the names click-beetle (q.v.) and SKIP-JACK. The spine and groove of the thorax are supposed to be of use in this. The larvæ are long, rather slender, with six feet near the head, and a tough skin. Many feed on rotten wood; others, wire-worms (q.v.), on the roots of plants. Many are British. Some of the *elateriæ* of tropical regions diffuse from spots on the thorax a strong and beautiful light, and are called fire-flies (q.v.).

ELATERIUM, a drug obtained from the fruit of the SQUIRTING CUCUMBER, or SPIRTING CUCUMBER (*ecbalium agreste*, formerly known as *momordica elaterium*), also called the wild cucumber, an annual plant of the natural order cucurbitaceæ, a native of the s. of Europe, common on rubbish in the villages of Greece and the archipelago. The whole plant is rough, with stiff hairs; it has a trailing branching stem, without tendrils; the leaves are heart-shaped, somewhat lobed and toothed, on long stalks; the flowers axillary, yellow, the male flowers in small racemes; the fruit oblong, about an inch and a half long, grayish green, covered with soft prickles, and finally parting from its stalk, and expelling its seeds along with a thin mucus through the aperture where the stalk was inserted. This remarkable phenomenon is ascribed to osmotic action within the fruit; a thin membrane separating a mucus which immediately surrounds the seeds from a less dense juice which abounds in the succulent part of the fruit, and the quantity of the former being gradually increased at the expense of the latter, till, on the perfect ripening of the fruit, the much distended central cell is opened, to permit its ejection. It is this mucus surrounding the seeds—a thick green mucus of a very peculiar character—which contains the elaterium. To obtain the drug, the juice of the nearly ripened fruit is allowed to stand for a short time, when it becomes turbid, and deposits a sediment. The sediment, carefully collected and dried, is elaterium. It is of a pale grayish-green color, light and friable, with an acrid taste, and a peculiar not unpleasant odor. It is an exceedingly powerful or drastic purgative, used chiefly in dropsies, and in very small often-repeated doses. It should not be used except under medical advice. It acts as an irritant not only on the eyes, if it comes in contact with them, but even on the fingers of those who handle it. Its properties seem to depend chiefly on a crystalline principle called *elaterin*. The use of E. was known to the ancients.

ELATH, or **ELANE** (now **AILAH**), a t. in Idumea on the shore of the Elanitic gulf of the Red sea; the place where Solomon fitted out his ships for bringing treasures from Ophir. David captured it from the Edomites. It is an important point in the route between Medina and Cairo.

ELATMA. See **JELATOM**.

ELBA (Lat. *Ilea*, Gr. *Æthalia*), an island belonging to the kingdom of Italy, in the Mediterranean sea, between Corsica and the coast of Tuscany, from the latter of which it is separated by the channel of Piombino, a strait 5 m. in breadth. Its greatest length is about 18 m., and its breadth varies from 3 to 10 m., this irregularity being caused by indentations both on its northern and southern shores. Its area is about 90 sq. miles. The coast is bold and precipitous. The surface is traversed from w. to e. by a chain of mountains, which divides into two spurs at the eastern extremity of the island; the highest summit, Monte della Capana, attaining an elevation of 3,500 ft. above sea-level. These mountains are for the most part bare; but on their lower ridges and in the valleys, the vine, olive, mulberry, and other trees flourish. The climate, except in the low-lying districts on the shore, is temperate and healthy. There are few streams in E., but it has numerous wells. The principal products are wine, white, red, and sweet, and of good quality; wheat, Indian corn, vegetables, and water-melons. Great quantities of salt are produced annually from the salt-pans on the shore. Sheep, goats, pigs, and asses abound, but horned cattle and horses are scarce; the coasts supply fish plentifully. Iron of excellent quality is obtained from a mountain in E., 2 m. in circumference, and 500 ft. in height. This hill, which stands on the e. coast, is almost entirely a mass of ore, and so rich that it yields from 50 to 75 per cent. E. also yields loadstone, alum, vitriol, and marble. Porto Ferrajo, the capital and residence of the governor, has a population of about 4,000. E. has been rendered famous in history from having been Napoleon's place of exile from May, 1814, till Feb. 1815. Pop. about 24,000.

EL BASSAN, **ALBASSAN** or **ILBASSAN**, a t. of European Turkey, in the province of Albania, on the Scombi, 35 m. e. from the mouth of the river. It stands in a fertile plain, surrounded by mountains, is the capital of a sanjak, and the seat of a Greek bishop. It has manufactures of iron and copper wares. Pop. about 15,000.

ELBE (called by the Romans *Albis*—i. e., white—and by the Bohemians *Labe*), an important river of northern Europe. It originates in the confluence of numerous

streams which rise at the south-western base of the Schneekoppe (Snowcap), one of the highest summits of the Riesen-Gebirge, a mountain-range on the northern border of Bohemia. The course of the E. begins near lat. $50^{\circ} 45'$ n., long. $15^{\circ} 36'$ e.; at an elevation of about 4,400 ft. above sea-level. Its total length, including windings, is estimated at from 700 to 720 m. and its basin at 56,000 sq. miles. The average depth of the E. is 10 ft., and its mean breadth 900 ft., although occasionally it has a width of upwards of 1000 ft., and at its mouth of several miles. In the course of its progress to the sea, it is joined by 17 rivers and upwards of 70 streams. From the base of the Schneekoppe, it flows s. to Pardubitz, whence it proceeds w. to Brandeis, and afterwards in a general n.w. direction past Melnik, Leitmeritz, Aussig, and Tetschen, where it quits the Bohemian territory, and enters Saxony. At this point, it is 355 ft. wide. Its principal affluent in Bohemia is the Moldau. On its course n.w. through Saxony, the E. passes Pirna, Dresden, and Meissen, and entering Prussian Saxony, about 7 m. above Mühlberg, it advances to Rorgau and Wittenberg, from which point it flows first w., then n.w. to Magdeburg, receiving in its progress the Mulde and the Saale, both from the left. From Magdeburg flowing n.e., the E. arrives at the border of Brandenburg, receiving the Havel from the right; then turning n.w., it forms the boundary between Prussian Saxony and Brandenburg, and enters Hanover, through which it flows for upwards of 30 miles. Then still flowing n.w., it forms the boundary of Lauenburg, the Hamburg territory, and Holstein on the n., and Hanover on the s., until it empties itself into the North sea at Cuxhaven, where it attains a breadth of upwards of 10 miles. At this point, the tide rises 12 or 13 feet. The E. is divided into several branches between Hamburg on the n., and Harburg on the s., by the numerous islands that there interrupt its course. Vessels of 14 ft. draught can at all times ascend to Hamburg. The scenery of the valley of the E., although generally pleasing, is not remarkable in any portion of its course, except that which extends between Aussig and Dresden. Between these two towns, the course of the E. is generally between bold cliffs, and high natural battlements of rock; the banks covered with foliage, wherever a tree can support itself; and occasionally varied by a strip of green glade. It has been said that here the E. has all the variety of the English Wye, on a scale nearly as majestic as that of the Rhine. Its waters are stocked with abundance of highly esteemed fish; beavers likewise build in the stream. Steam-boats ply from Dresden up the river, and down as far as Torgau, as well as from Magdeburg to the sea. The navigation of the E. was formerly impeded by all manner of imposts and monopolies.

ELBERFELD, one of the most important manufacturing towns in Germany, is situated on both sides of the Wupper, an affluent of the Rhine, 16 m. e.n.e. of Düsseldorf. Its site, in the narrow and hill-girt valley of the Wupper, is picturesque and healthy. The old parts of the town are poorly built, straggling, and irregular, but the more recently erected portion is well built, with numerous spacious and imposing buildings, in a high architectural style. E. is chiefly famous for its dyeing, bleaching, and printing establishments, also for its extensive and important manufactures of cotton, silks, tapes, ribbons, merinos, fancy woollen goods, velvets, etc. Bleach-fields occupy a great part of the environs of E., and of the banks of the Wupper, the waters of which are said to possess very valuable bleaching properties. At E., the well-known dye, Turkey red, is imparted to yarns, at a cheaper rate, and with more clearness and firmness of color, than at any other town in Europe. The patterns for the printed goods are designed at Elberfeld. E. supports, amongst its numerous educational institutions, an important establishment, in which young manufacturers and overseers are taught the management of the Jacquard-loom, pattern-drawing, etc. Like the rest of the Wupper valley, E. is notable for religious zeal and orthodoxy. Pop. of Elberfeld, '95, 139,168. E. is connected by a tramway with the neighboring town of Barmen (q. v.), also the seat of extensive manufactures.

ELBERT, a co. in e. Colorado, bordering on Kansas; formed 1874; intersected by Bijou, Kiowa, and Big Sandy creeks, and Union Pacific railroad; surface, an elevated treeless plain; soil arid. Area, 1880 sq. m. Pop. '90, 1856. Co. seat, Kiowa.

ELBERT, a co. in n.e. Georgia, on the Savannah river; 406 sq. m.; pop. '90, 15,376. Surface hilly, with much forest land; soil fertile, producing corn, cotton, etc. Co. seat, Elberton.

ELBERT, SAMUEL, 1743-88; b. S. C.; served in the revolutionary army, rising to brevet brigadier-general. In 1785 he was elected governor of Georgia.

ELBEUF, or **ELBEUF**, a manufacturing t. of France, in the department of Seine-Inférieure, is delightfully situated in a picturesque valley on the left bank of the Seine, about 75 m. n.w. from Paris. It was originally badly built, but it has been greatly improved. Large factories also have arisen rapidly; and a spacious market-place (*champ de foire*), adorned with rows of chestnut-trees, has been erected. The two principal public buildings of E. are the churches of St. Étienne and St. Jean-Baptiste, both containing fine specimens of richly painted glass. The factories of E. and the vicinity, which are very numerous and are for the most part worked by steam-power, give regular employment to a great part of the population. The manufactures are principally double-milled and waterproof cloth, flannel fabrics, billiard table-

covers, and light woollens of every color and description. E. has active steam communication with Paris, Havre, and Rouen. The pop. in '91, was 21,097. E. which has been called the Leeds of France, had 80 cloth manufactories as early as the 16th century. In consequence of the revocation of the Edict of Nantes, the greater number of the cloth manufacturers emigrated; and it was not till after the revolution of 1789, and more particularly since the separation of Belgium and France, that industry again began to flourish.

ELBING, a considerable trading and manufacturing t. in West Prussia, is situated in the midst of a fertile valley, on the navigable river of the same name, 34 m. e.s.e. of Danzig, and 5 m. s. of the s.w. extremity of the Frisches Haff, into which the Elbing flows. It is connected by a canal with the Nogat, the eastern arm of the Vistula. The town was formerly surrounded with walls and mounds, of which, however, there are now but few remains. Of the numerous churches, the most remarkable is the Marienkirche, erected in the 14th century. The gymnasium, founded in the year 1536, contains the town library. There are likewise several well-conducted educational and charitable institutions. Among its manufactures are machinery, linen and cotton cloths, leather, tobacco, soap, and chicory. There are also oil manufactories, iron foundries, breweries, dye and print works, and a shipbuilding yard. E. was founded about the beginning of the 13th c. by colonists from Lübeck and Bremen, who settled round the fortress erected by the German knights. After various vicissitudes it was annexed to Prussia in 1772, and after a period of decline, has again risen to a thriving condition. The larger vessels unload at Pilau, which serves as the harbor of Elbing. Pop. '90, 41,578.

ELBOW. See ARM.

ELBOW-PIECES, in armor, or *coudières*, were the metal-plates used to cover the junction of the rere-brace and vant-brace, by which the upper and lower half of the arm were covered. They increased to an enormous size, as in the effigy of sir Thomas Peyton, in Isleham church, but again decreased to their normal size. An *elbow gauntlet* was a gauntlet of plate reaching to the elbow, adopted from the Asiatics in the 16th century.—Fairholt's *Costume in England*, p. 494.

ELBURZ', a lofty mountain-range that runs longitudinally along the entire southern border of the Caspian sea. It frequently divides itself into subordinate parallel ridges, inclosing extensive and fertile valleys, many of which are well inhabited and carefully cultivated. Demavend (q.v.), said to be 21,000 ft. in height, is one of the highest summits.—**ELBURZ**, or **ELBRUZ**, is also the name of one of the summits of the Caucasus, 18,500 ft. high.

ELCHE (anciently, *Alíce*, or *Illice*), a t. of Spain, in the province of Alicante, and 13 m. s.w. of the town of that name, is picturesquely built on both sides of a steep ravine, near the Elda, a tributary of the Segura, and about two leagues from the sea. It has an oriental appearance. The climate is eastern, winter is unknown, and around the town rises a huge encircling plantation of palms; the Arab alone is wanting to complete the likeness to an eastern city. E. is a flourishing town, is well built, its streets in general are wide and clean, and it has numerous squares and public walks. The church of Santa Maria is an imposing edifice, with a large dome, five gates, a famous organ, and a tabernacle made of precious marbles. The dates gathered from the palm plantation around E. are exported from Alicante; they are not so good as Barbary dates, though sold as such. Its manufactures are linens, woollens, cottons, brandy, wine, cigars, oil, soap, etc.; in these articles, and in cattle, rice, and wool, there is a considerable trade. Pop. 1887, 23,854.

ELCHINGEN, a village of Bavaria, on the left bank of the Danube, about 8 m. n.e. of Ulm. It is noteworthy as the scene of a battle fought on the 13th Oct., 1805, between the French under Ney and the Austrians under Laudon, in which the latter were defeated. Ney's victory obtained for him the title of duke of Elchingen.

ELCHO, FRANCIS WEMYSS-CHARTERIS-DOUGLAS, Lord, b. Aug. 4, 1818, is eldest son of the eighth earl of Wemyss. This ancient Scottish family has a traditional descent assigned it from the house of Macduff, earl of Fife. Sir Michael de Wemyss in 1290 was sent to Norway by the lords of the regency in Scotland to conduct the young queen Margaret to her dominions. He swore fealty to Edward I. in 1296, and was a witness to the act of settlement of the crown of Scotland by king Robert I. at Ayr in 1315. From him lineally descended Sir John Wemyss, who was created a baronet in 1625; raised to the peerage of Scotland as baron Wemyss of Elcho in 1628; and advanced to the dignities of earl of Wemyss in the county of Fife, and lord Elcho and Methel, in 1633. Although indebted for his honors to Charles I., he was engaged during the subsequent civil wars on the side of the parliament. David, fourth earl, was appointed by queen Anne lord-high-admiral of Scotland, and one of the commissioners for concluding the treaty of union. The eldest son of the fifth earl having taken part in the rising of 1745, escaped to France after the battle of Culloden, and was attainted. At his death, the family honors were taken up by his brother Francis, sixth earl, who, having inherited the estates of his maternal grandfather, Col. Charteris, of Amisfield, co. Hadding

ton, had assumed the surname of Charteris before that of Wemyss. Francis, his grandson, became heir to the titles of earl of March, viscount Peebles, and baron Douglas of Niddpath, on the demise of William, third earl of March, and fourth duke of Queensberry, in 1810. In 1821, he was made baron Wemyss of the United Kingdom, by which title the possessor of the earldom holds his seat in the house of lords. A parliamentary reversal of the attainder of lord Elcho, obtained in 1826, put beyond question the succession to the Scottish honors. His son, the present earl, is lord-lieut. of Peebleshire, and lieut.-gen. of the royal archers.

Lord E. was educated at Christ Church, Oxford, where he graduated B.A. in 1841. He was returned to the house of commons as M.P. for East Gloucestershire from July, 1841, to Feb., 1846, and has sat for Haddingtonshire since 1847 to the present time. He took his seat on the conservative benches, but accepted office, with other members of the party of sir Robert Peel, in the coalition government of the earl of Aberdeen, and was a lord of the treasury from Jan., 1853, to Feb., 1855. In 1859, the menacing attitude of France, and the periodical recurrence of seasons of alarm, caused by the unprotected state of our shores, and the possibility of invasion, led to an organization of rifle volunteers in Great Britain. In this movement, lord Elcho took the earliest and most prominent part. He organized a regiment of London Scottish volunteer rifles, of which he was appointed maj. in 1859, and lieut.-col. in 1860, and went to Hythe barracks to receive instruction in the use of the Enfield rifle, and to the camp at Shorncliffe, in order to become familiarized with regimental duties and brigade movements. Lord Elcho also projected the national association for the promotion of rifle-shooting, the first shot at which was fired by her majesty, July 2, 1860, at Wimbledon. He and other patriotic noblemen and gentlemen associated with him in the volunteer movement, had the satisfaction of assisting, in 1860, at two grand reviews by the queen of various brigades of volunteer rifle corps—of 20,000 men in Hyde park, and 22,000 men in Edinburgh. The war office assisted in organizing the force, and thus was consolidated the volunteer army of Great Britain, who adopted as their motto "Defence, not Defiance." The national rifle association, mainly under the auspices of earl Spencer and lord E., has become an established institution—the center and keystone of the volunteer movement. Lord E. has since given additional efficiency to the volunteer movement by watching, in his place in parliament, its financial relations with the government. In 1865, lord E. took a more active part in parliamentary politics than had been possible during his labors in promoting the volunteer movement. He spoke against the £6 franchise proposed by Mr. Baines, and gave notice of a motion for a royal commission to examine into the extension of the franchise. When the government of earl Russell brought in the reform bill of 1866, lord E. organized a secession from the Whig party, under the leadership of earl Grosvenor, which was nicknamed the "Cave of Adullam," but which succeeded in defeating the bill, and displacing the government. Lord Derby, on his accession to the premiership, offered a post in his government to lord E., but the offer was declined. In 1867, his party found themselves powerless to prevent the passing of a more democratic reform bill than that which in the previous year they had thrown out. Lord E. is a fluent and pleasant speaker, and he is exceedingly popular with the volunteers both of England and Scotland. Lord E. is an LL.D. of Edinburgh university. In 1871, he published *Letters on Military Organization*. In 1883, on the death of his father, he succeeded to the earldom of Wemyss.

ELDER, *Sambucus*, a genus of plants of the natural order *caprifoliaceæ*, consisting chiefly of shrubs and trees, with pinnate leaves, small flowers of which the corolla is wheel-shaped and 5-cleft, and 3-seeded berries. The wood of the young shoots contains a very large pith. The species are very widely distributed.—The COMMON E. (*S. nigra*), the *bouree* of the Scotch, is a native of Europe, the n. of Asia, and the n. of Africa. It is found in all parts of Britain. It is a very large shrub, sometimes a small tree, with rather large leaves, and large terminal cymes of cream-colored flowers, which are followed by small black—or rarely whitish—berries. Its leaves and young shoots diffuse a narcotic odor, and it is said to be dangerous to sleep under its shade. The inner bark has a bitter acrid taste. The leaves possess the same properties in a rather milder degree. The flowers have a peculiar sweetish and rather sickening smell, but are much used for making a distilled water—*elder-flower water*—which has a very agreeable odor, and is employed both in perfumery and confectionery. Distilled with water alone, they yield a volatile oil, which, on cooling, assumes a buttery consistence. A popular cooling ointment is made by boiling them in lard. They are also used for imparting a flavor to currant-wine and jelly, being added at the time of a slight fermentation which takes place in the spring of the year, after the currant-wine is made; and a wine is made from them which in scent and flavor resembles Frontignac. The clustered flower-buds are pickled, and used like capers. A grateful wine, well known in England, especially about Christmas, is made from the berries; and in some parts of Kent there are large plantations of E. to supply the London market for its manufacture. It is generally drunk hot or *muddled*. The berries are subacid and sweetish, with a rather unpleasant flavor. A rob made from them is a gentle aperient, diuretic, and sudorific, easily administered to children. In some parts of Germany, the poorer people use them as an ingredient in soups. They are said to be used to no small extent in England in the

adulteration of port wine, and the manufacture of spurious port wine.—The wood of the E. is yellow; that of old trees is very hard and tough, takes a fine polish, is used by turners, and as a substitute for box-wood in making mathematical instruments and other articles. Tops of fishing-rods are sometimes made of it. The pith of the young shoots, being very light, is generally used to make pith-balls for electrical experiments. Toys for children are also made of it; and few boys are unacquainted with the use of E. branches, from which it has been expelled, for making pop-guns. The E. is very useful as a screen-fence near the sea and in other exposed situations, as it grows with remarkable vigor, and makes great shoots, the destruction of the more tender and less matured parts of which in winter only tends to make it more bushy and useful for shelter. It is readily propagated by portions of its shoots stuck into the ground.—The SCARLET-FRUITED E. (*S. racemosa*), a native of the s. of Europe and of Siberia, much resembles the common E., but has softer and more herbaceous shoots, remarkably large buds, which are conspicuous in winter, and racemes of greenish-white flowers, which are followed by scarlet berries, the racemes of ripe fruit having much the appearance of beautiful pieces of coral. It is a frequent ornament of shrubberies in Britain, and when in full fruit, is almost unrivaled in beauty, but more frequently produces its fruit in cold districts than in those where the milder winter induces it to flower before the spring frosts are over. The juice of its berries is a powerful sudorific.—The DWARF E., or DANEWORT (*S. ebulus*), is a rather rare British plant, a coarse, herbaceous plant, with fetid smell. The inner bark has been employed in dropsical complaints as a hydragogue cathartic, and is given in the form of a decoction prepared by boiling down 1 oz. of the bark in 2 pints of water till the whole is concentrated to 1 pint. The dose is about 4 fluid ounces. In smaller quantities, it is useful as an aperient in certain chronic disorders. The flowers are white when freshly plucked, but become yellow in drying, and consist of a volatile oil, certain gummy, resinous, albuminous, and saline matters, and are stimulant and sudorific. They are employed in the preparation of elder-flower water by adding 2 gallons of water and 3 ozs. of rectified spirit to 10 lbs. of the flowers, and distilling off about 1 gallon. It is a good perfume. White elder ointment is procured by boiling equal weights of lard and elder flowers, and pressing through a cloth. It has an agreeable odor, and is employed as a cooling application to flesh. *S. canadensis* and *S. pubens* are North American species; the former, which is very common along roadsides and fences, resembles *S. nigra* closely, and *S. pubens* approaches *S. racemosa*, being very showy when in fruit. *S. glauca* of the Pacific states, and *S. mexicana* of the south-west are larger species.

ELDER, an office-bearer in Presbyterian churches. The name is an exact translation of the Greek *presbyteros*, which occurs frequently in the New Testament, and from which the English word *priest* is derived. That the *presbyteroi* of the churches of the apostolic age were not *priests* in the special sense of that word, in which it denotes a person appointed to offer sacrifice on behalf of others, and to appear for them before God, is admitted by Protestants in general; but there remains much division of opinion as to the precise meaning of the term, and the bearing of the passages in which it occurs on the subject of church government. See BISHOP, INDEPENDENTS, and PRESBYTERIANISM. All are agreed, indeed, that *bishops* and all pastors of congregations are included among *elders* in the Scriptural use of the term; but the ordinary use of it is now limited to Presbyterian churches, and in them it has become the usual designation of the office-bearers associated with the minister of each congregation in the care and oversight of the flock. The argument for this class of office-bearers will be found briefly stated in the article PRESBYTER. They exist in the greater number of the churches of the reformation; and even in the church of England, bishop Burnet states that their introduction was only prevented by queen Elizabeth's dislike to a proposal, in which, with Burleigh and others of her advisers, she saw danger of an abatement of her prerogative, "since, if the concerns of religion came into popular hands, there would be a power set up distinct from hers, over which she could have no authority." In some Protestant churches, elders are appointed only for a certain term of office; but more generally it is until death, resignation, removal from the bounds of the congregation, or deposition. The appointment of elders takes place variously: in the established church of Scotland, they have generally been nominated by the kirk-session (consisting of the minister and elders); in the other Presbyterian churches of Britain and America, they are elected by the congregation. In most of the churches of the continent of Europe, which have any kind of connection with the state, there is some regulation of the civil law or of the civil authorities in this matter. The ordination of elders takes place in the congregation, but usually without imposition of hands; a difference between the mode of ordination of elders and ministers for which it is not easy to account, and which has certainly tended to produce a general impression that a greater difference of office subsists than the advocates of Presbyterianism admit. In the established church of Scotland, the elders have very generally discharged the functions of deacons (q. v.), at least as much as those which, according to the theory of Presbyterianism, belong to their own office; an example which, until recently, was almost universally followed in other Presbyterian churches. According to the *Second Book of Discipline* of the church of Scotland, it is the duty of elders to watch over the spiritual welfare of the people, to admonish, to visit the sick, to assist in the examination of persons seeking admission to the Lord's table,

etc. Elders, along with ministers, compose all the courts or assemblies of the Presbyterian churches, and have equal votes on all questions.

ELDER, WILLIAM HENRY, D.D., b. Baltimore, in 1819; educated in that city and at the coll. of the Propaganda, Rome; was prof. and pres. of Mt. St. Mary's coll., Emmetsburg, Md.; and was consecrated Rom. Cath. bishop of Natchez, Miss., 1857. He endeared himself to the people of his diocese by his labors among the sick and wounded during the late civil war. For some time coadjutor to abp. Purcell, he was elevated to the archiepiscopal see of Cincinnati, upon the death of the latter prelate, 1882.

ELDEST SON OF THE CHURCH (*Fils aîné de l'église*), a title applied to the king of France with the same general motive as that with which he was styled Most Christian King, i.e., to show his relation to the Church. The title, Eldest Son of the Church, is not as common as Most Christian King.

ELDON, BARON, Lord High Chancellor of England. John Scott, better known as lord Eldon, was b. 4th June, 1751, in Love lane, Newcastle, of obscure but respectable parents. William Scott, his father, began life as an apprentice to a "fitter," a sort of water-carrier and broker in coal; later in life, he became a "fitter" himself, and kept a public-house near the quay, to supply drink to his keelmen on the truck-principle; he engaged also in speculations in shipping and marine insurance. By his various occupations he became wealthy, and died worth about £20,000. John Scott's mother was a daughter of a Mr. Atkinson of Newcastle, and to her, lord Campbell, in his *Life of Lord Eldon*, traces the talent inherited by her sons William and John. William became baron Stowell, and was the head for many years of the high court of admiralty. See **STOWELL, BARON**.

John Scott was educated under the Rev. Hugh Moises, at the grammar-school, Newcastle, and as a boy gave no promise of his subsequent splendid career. On finishing his education under Mr. Moises, he, on 15th May, 1766, entered University college, with a view to the church; the following year he obtained a fellowship, and in the summer of 1771, won the prize for the English essay, but did not otherwise distinguish himself. A clandestine marriage, into which he entered with a Miss Surtees in 1772, nearly ruined him; however, by the advice of his brother, he returned with his wife to the university. Here, during the year of grace, he lived on his fellowship and gains as a private tutor; and the year expiring without a church living falling vacant, he betook himself to the study of law. In 1776, he was called to the bar. By this time, his wife's friends had become reconciled to her, and made her some provision; and by the death of his father, in the year of his passing at the bar, E. found himself in possession of £3,000. On his own and wife's money, he found he could just manage to live, and so settled on the northern circuit. His success on his first circuit was not great; but in his second year his prospects, through the aid of his brother and friends, began to brighten. It was not, however, till 1780, that prosperity could be said to have dawned upon him. A happy chance then occurred of showing both his talents and powers of work. The result was speedy affluence. Business poured in upon him; and by 1787, his practice at the equity bar had so increased, that he was forced to give up the eastern half of his circuit.

With success in his profession, E.'s ambition expanded, and he became political. A silk-gown, and then, through the favor of lord Thurlow, a seat in parliament, were but steps toward knighthood and the post of solicitor-general conferred on him by Pitt. From this point, his progress was secure, and effected much in the way in which political lawyers usually succeed. In 1793, he became attorney-general. In 1799, the office of chief-justice of the court of common pleas falling vacant, his claim to it was not overlooked; and after 17 years' service in the house of commons, he entered the house of peers as baron Eldon. In 1801, on the formation of the Addington ministry, E. ascended the woolsack—a post given to him nominally because of his great anti-Catholic zeal, but really because of his part in the intrigue which ousted his old patron Pitt from office. From this time till 1827, with little intermission, E. continued to occupy the woolsack under successive governments. He was in succession chancellor under Addington, Pitt, and lord Liverpool; and when, after the two brief administrations of Canning and Goderich, the duke of Wellington constructed a cabinet, E. again expected the woolsack, and resented his non-appointment to it. His love of office indeed continued to the last, and in 1835, we find him actually in hopes of office under Peel. In 1834, he ceased to speak in parliament. In 1821, E. was made an earl by George IV. He died, Jan. 3, 1838.

E. is said to have been a man of very winning and courtly manners, and of a handsome, prepossessing appearance. In the circle of his friends he is said to have been irresistible, and probably to the charms of his manner his success in life was somewhat owing. His career amply proves that he was a man of the greatest talent, sagacity, and power of managing men. He was undoubtedly a great lawyer, and his judgments, which have been much praised for their accuracy, fill a small library; at the same time, he took so long to arrive at them, that he has been charged with having caused more injustice by delay than worse judges by the iniquity of their decisions.

EL DORADO (the golden or rather the gilded land) existed originally in the imaginations of the Spanish conquerors of America, whose insatiable avarice loved to dream of richer rewards than those of Mexico and Peru. The Castilians found an imitator in sir Walter Raleigh, who twice visited Guiana in quest of this fabulous region. The name has at last made for itself an abiding-place beyond the furthest limits of Spanish possession. It indicates a co. in the n.e. of California, in which the town Coloma stands, near the spot where the first discovery of gold was made in that state. The district in question is drained by some of the northern feeders of the Sacramento, which empties itself into the bay of San Francisco.

ELDORA'DO, a co. in e. California, reached by the Southern Pacific railroad, drained by branches of the American and the Cosumne rivers; 1790 sq. m.; pop. '90, 9232, includ. Chinese. It is mountainous, and much of the surface is yet covered with forests of oak and pine. The Sierra Nevada mountains cross the e. part. In the low lands the soil is fertile; but gold-mining is the leading business. Co. seat, Placerville.

ELDREDGE, NATHANIEL BUEL; b. N. Y., 1813; practiced medicine for 15 years; then law for 20 years; served through the civil war and became a colonel of volunteers; and afterward engaged in farming. He was a member of the Mich. legislature, 1848; and was elected to congress as a democrat in 1882 and 1884. He d. in 1893.

EL'EANOR OF AQUITAINE, 1122-1204, Queen of France and afterwards of England, was the daughter of William IX., the last duke of Guienne. She succeeded her father in 1138, and was married the same year to Louis VII. of France. Her lively and somewhat frivolous manners, and her love of pleasure, did not fit her for the society of a husband who was naturally austere, and who from religious conviction had adopted many ascetic habits. They became gradually estranged, and in the Holy Land, whither she accompanied him in 1147, their quarrels became so frequent and so bitter that at last a divorce was agreed upon, which, on their return to France, was completed under the pretext of kinship, 1152. Six months afterwards she gave her hand and her possessions to Henry of Navarre, who in 1155 mounted the throne of England as Henry II. That the duchy of Guienne should thus become permanently annexed to the English crown was naturally displeasing to Louis, and the indirect consequence of his displeasure was protracted wars between France and England. In other respects, the marriage had unhappy consequences. The infidelities of Henry, and the special favors he showed to one of his mistresses, so greatly aroused Eleanor's jealousy that she incited her son Richard to rebellion, and also intrigued with her former husband to get him to lend his influence to the great league formed against Henry in 1173. Her son had fled to Louis, and she was preparing to follow him when she was arrested and placed in confinement, where she remained till the death of her husband, 1189. As soon as he died she regained her liberty, and reigned as regent until Richard's arrival from France. She also held this position during Richard's absence in the Holy Land, for which he left in 1190. After his escape in 1194 from the captivity which befell him as he was returning home, she retired to the abbey of Fontevrault, where she died. There is a curious story told of Eleanor by Higden, monk of Chester, relating to one of Henry's mistresses known as "Fair Rosamond," of whom the queen was extremely jealous. Higden says: "She was the fayre daughter of Walter lord Clifford, concubine of Henry II., and poisoned by queen Eleanor, A.D. 1177. Henry made for her a house of wonderful working, so that no man or woman might come to her. This house was named Labyrinthus, and was wrought like unto a knot in a garden called a maze. But the queen came to her by a clue of threddele, and so dealt with her that she lived not long after."

ELEATIC SCHOOL. The group of ancient Greek philosophers so called begins with Xenophanes of Colophon, who settled in Elea, a Greek city of lower Italy (whence the name), and includes Parmenides and Zeno, who both belonged to Elea, and also Melissus of Samos. The most flourishing period of this philosophy falls from 540 to 460 B.C. In opposition to the physical philosophy of the Ionic school, and to the doctrine of Heraclitus (q.v.), who denied all being or existence, the Eleatic philosophers made this conception of pure being, unmixed with all marks or properties derived through the senses, the foundation of all their speculations. As being, one and unchangeable, seemed to them to exclude all plurality and alteration of appearances, they gave up, with remarkable consistency, all attempts to explain scientifically the world as we see it; and the startling abruptness of their simple fundamental principle, taken in conjunction with the opposite doctrine of Heraclitus, was one of the chief causes that led Plato at a later period to attempt a reconciliation between the notions of *being* and *becoming*, or of absolute existence and phenomena.

ELECAMPANE, *Inula*, a genus of plants of the natural order *compositæ*, sub-order *corymbifera*, nearly allied to *aster*. The only important species is the common E. (*I. Helenium*), a native of damp meadows in the middle and s. of Europe, rather rare in Britain. This plant was formerly much cultivated for its root, which was used in

medicine, and still retains its place in the pharmacopœias, although comparatively neglected. The root has a faint aromatic odor; and a bitter, acrid, and somewhat camphor-like taste. It acts as a gentle stimulant to the organs of secretion, promotes expectoration, and is diuretic and sudorific. It contains a peculiar principle called *inulin*, which resembles starch, but is deposited unchanged from its solution in boiling water on its cooling, and gives a yellowish instead of a blue color with iodine; also another peculiar principle called *helenin*, or *elecampane camphor*, which resembles camphor in some of its properties.

ELECTION denotes, in theological language, the divine act by which certain individuals are chosen to salvation in Christ, and the doctrine of election is the doctrine of "God's everlasting purpose, whereby He hath constantly decreed by his secret counsel to deliver from curse and damnation those whom He has chosen in Christ out of mankind, and to bring them by Christ to everlasting salvation as vessels made to honor." These words, taken substantially from the articles of religion of the church of England, may be said to represent, in a moderate form of expression, the orthodox doctrine on the subject of election. Besides this form of the doctrine, there is a lower and a higher form of it, which, apart from technical and polemical language, may be said to spring—the one from the supposed subordination of the divine act or purpose to the divine foreknowledge of human conduct—the other from the exaltation of the divine act or purpose into an absolute and arbitrary supremacy, having no relation whatever to human will or conduct. The former of these extremes corresponds to the Pelagian or Arminian doctrine of election, the latter to the hyper-Augustinian or Calvinistic. The Arminian aims to condition or limit the absolute character of the divine act in redemption in some way or another; the Calvinist aims to give to this act the most arbitrary and irresponsible character. The one, while not altogether repudiating a doctrine of election, yet gives such prominence to the human conditions of the elective purpose, as (in the view of Calvinists) to destroy it altogether; the other maintains not only a doctrine of election or predestination, but also the correlative doctrine of reprobation. In the view of the Arminian, salvation is within the choice of the human will; in the view of the Calvinist, the human will is of little or no account—the decree of God is everything—and this decree (which Calvin admitted to be a "*decretum horribile*") absolutely determines some to everlasting life and some to everlasting death. The separation has its source in the will of God, and not in the moral conditions of mankind.

It is obvious, in the mere statement of such views, how audaciously theology has sought to settle questions beyond all human scrutiny and settlement. In the nature of things, the relations between the divine and human will appear indeterminable; and, notwithstanding all the labor of inquiry devoted to such subjects in the past history of opinion, it cannot be said that any advance of thought has been made regarding them. If the mere logic of the question be kept in view, the Calvinistic opinion has the advantage over the Arminian—setting out, as it does, from the recognition of the divine will as absolutely supreme, and the source, consequently, of all subordinate action—a thought which is in the highest degree logically consistent. But then the moral perplexities which arise out of the practical application of this view, and the ease with which it may be perverted into a fanatical and dangerous error, will always repel many minds from its adoption.

Although the expressions election, elect, etc., are frequent in Scripture, it cannot be said that what is known as the theological doctrine of E. was acknowledged by the Christian church till the time of Augustine. The Greek fathers confined their attention almost entirely to questions purely theological—that is to say, relating to the character and constitution of the Godhead. Gnosticism and Arianism, the two main forms of heretical opinion before Augustine, indicate the channels into which theological discussion had previously run. It was not till the Latin mind had taken up this discussion, that the more practical question of the relation of the divine and human will in redemption came to receive special attention. The controversy between Pelagius and Augustine in the beginning of the 5th c., brought out almost all the aspects of the question which have since, at successive epochs in the history of the church, risen into renewed prominence. The contests between the Scotists and Thomists in the 14th c., between the Arminians and Calvinists, and, within the Roman church, between the Jansenists and Molinists in the 17th c., are recurring expressions of the same radical conflict or divergency of opinion. The spirit of modern theology is adverse to the logical disquisitions engendered by such discussions, and finds its more appropriate and useful field of labor in the province of critical and historical inquiry.

ELECTION, in law, the choice between alternating and incompatible rights or claims; as when an insurance company, according to the terms of its policies, elects whether it will pay in cash for property insured and destroyed, or replace the same in kind and value. This right of alternative choice is of special importance in equity practice, in which instances are constantly occurring.

ELECTION, in politics, is the choice of public officers by popular suffrage, in distinction from "appointment" of those in a lower by those in a higher grade. Popular elections were not unknown in ancient times and in the middle ages. The system has had a slow development in England, and has been imitated and improved by other

countries. In the United States, elections are of three grades—1. Local or municipal; 2. State; 3. National. State elections are for executive and legislative, and sometimes for judicial officers. National elections are held once in two years for the choice of members of congress, and once in four years for the choice of electors of president and vice-president of the United States. Elections are also sometimes held for the adoption or rejection of state constitutions or of amendments of the same. The provisions for local, municipal, and state elections are made in each state by the legislature thereof. The arrangements of national elections are made in part by state and in part by the national authority, the latter being supreme within its sphere, defined by the constitution.

ELECTION CAKE. A rich loaf-cake, which, in the days when Connecticut held an annual election, formed an important part of the refreshments offered to visitors to the state capital. The influx of relatives and friends at that time was the occasion of a generous hospitality, and inasmuch as the preparation of large batches of "election cake" was usually begun a week beforehand, and the ambitious housewife often had to sit up all night to watch her oven, no more important event, so far as the kitchen was concerned, occurred during the year.

ELECTION COMMITTEE. See PARLIAMENT

ELECTION LAWS. See PARLIAMENT ; BALLOT.

ELECTION OF SCOTTISH PEERS. See PARLIAMENT, PEER.

ELECTIVE STUDIES in colleges and universities are required studies of which the student must choose one or more, in distinction from prescribed studies in which there is no choice; sometimes, less properly, called optional studies, the latter name being better applied to extra studies which may be taken or not. In view of the modern additions to the departments of knowledge some colleges have established separate courses in arts, science, letters, philosophy, etc., with corresponding degrees. Other colleges, while giving the old degree of Bachelor of Arts, allow the student a choice of equivalent studies leading to this degree. According as the college regards its training as real rather than gymnastic it will admit electives, consideration being had of the age of the students as a factor in their ability to judge for themselves and in their fitness to pursue special studies. The univ. of Virginia, founded 1819, was one of the first to give electives. Harvard college, during the period 1825-56, made about one-fourth of the studies elective, beginning with Latin, Greek, and modern languages, and enlarging the list to include in the senior year also mathematics and the sciences. The system was again introduced, 1867, and has been continued with enlargement, and (as is claimed) with success. At present prescribed studies occupy the larger part of the Freshman year, but in the last three years only certain written exercises are prescribed. In Johns Hopkins univ. the student selects his studies under the guidance of a member of the faculty who acts as his adviser, without whose consent he may not enter any class. At Cornell there are no electives in the Freshman year; in the Sophomore year four hours a week out of 15 are elective; in the Junior and Senior years an average of 11 hours. Electives are also given in the scientific and other courses. In the univ. of Michigan, 24 "full courses" are required for the degree of A.B.; of these 10½ are prescribed. Of the 26 "full courses" required for the other degrees, 13½ are prescribed for science, 10½ for philosophy, etc. At Columbia, Princeton, and Yale, the electives are practically confined to the last two years of the course. In Yale, the plan introduced, 1885, enlarges the range of electives, but not by permitting immature students to choose or refuse every separate study. Instead of this, the studies are arranged in groups balanced and adjusted according to long experience, and these groups, varying widely in their total effect, are at the due time offered to the student's choice. From this new elective system much is expected, as combining the advantages of the old and the new. The whole question of elective studies in our colleges must be regarded as in a state of flux: distinguished authorities are ranged on either side. See COLLEGES, AMERICAN.

ELECTORAL COLLEGE, in the political system of the U. S., is the name given to the body of electors in each state who have been chosen to vote for a president and vice-president. These electors are chosen simultaneously by the people of every state on the Tuesday next after the first Monday in November. Their number is equal to the whole number of representatives which the state sends to both branches of congress; they are to meet at some place designated by the legislature of their state on the first Wednesday in December, and vote by ballot for president and vice-president, of whom one, at least, shall not be a resident of the same state with themselves. Each electoral college then makes a list of the names of all its candidates for president and vice-president, with the number of votes for each; the list is signed and certified by every member of the college, is authenticated by the governor of the state, and transmitted to the president of the senate of the U. S. On the second Wednesday in February the electoral votes are opened and counted in presence of both houses of congress, assembled in the chamber of Representatives, and the result is announced by the president of the senate. The persons who receive the highest number of votes, respectively, for the offices of president and vice-president are declared elected, provided they have received a majority of all the votes. In case of a

tie, the house of representatives, voting by states, each state having one vote, is to choose between the equal candidates for president, a majority of all the states being necessary to a choice. The senate has the power to choose in case of a tie on vice-president. In the same way, in case there is no tie, but the leading candidates fail to receive a majority of all the votes, the election for president is thrown into the house, and that for vice-president into the senate. Under the constitution as originally framed the electoral colleges did not designate their choice for president or vice-president, but when the total votes were counted by the president of the U. S. senate, the candidate receiving the highest number of votes was declared to be elected president, and his nearest competitor vice-president. But the 12th amendment to the constitution changed the mode of voting for the two officers, the electors being required to vote separately for president and vice-president.

The constitution states that "each state shall *appoint*" the electors "in such manner as the legislature thereof may direct;" and it had not been expected that they would be voted for. The electors, too, were to name and vote for such candidates as they individually preferred; but, never exercising this power, they always cast their votes in bulk for the candidates previously nominated in the national convention of their respective parties. The people, consequently, elect the president and vice-president in their state capacity, and the college is a cumbrous machine for formally conveying to Washington the wishes of the majority. The immediate cause of this change was the passage, 1801, of the 12th amendment, ostensibly to minimize the chances of a tie, but the result was that the president and vice-president were both chosen from the same party, and thus the fact of the existence of parties received its first constitutional recognition. Since 1801 the vote of an elector has been known with certainty several weeks before it is cast, and several months before it is officially announced. The electoral system has constantly endangered the state, on account of the absence, until recently, of any general law to govern the president of the senate in his canvass of the votes, and the tendency of congress to decide every case of doubt or disputed returns arbitrarily as it arose. Nothing was accomplished, however, until 1887, when a law was passed (approved February 3, 1887) to cover the contingency of rival electoral colleges and disputed returns. Under the terms of this act, each state is conceded to have the right of determining all controversies or contests regarding the appointment of its own presidential electors; and in case of any such contest, congress is to accept the state's settlement of the same as conclusive, and it cannot reject any electoral vote, duly certified, unless both houses concurrently decide that that vote has been irregularly given. If more than one return from a state is received, only those votes are to be counted which the state itself has endorsed as regular; but if the state has been unable to settle the question, owing to its having two or more rival sets of authorities, or from any other cause, then the two houses are to decide the dispute. In other words, the new law aims at preventing congress from setting aside or interfering in any way with the electoral returns from the various states, except in extreme cases, where the states have neglected or shown themselves unable to exercise their sovereign prerogatives in the matter. It is hoped that the law will prove an ample defense against all absolute danger pertaining to the electoral system; but no emendations can rid the system of its inherent faults. See CONVENTIONS, NATIONAL POLITICAL.

ELECTORAL COMMISSION, the body of men provided for by act of Congress, Jan. 29, 1877, to settle certain disputed questions in regard to the electoral votes of several states in the presidential election of 1876. The commission was composed of 5 senators, chosen by the senate; 5 members of the house of representatives, chosen by that body; and 5 associate justices of the supreme court, 4 of whom were designated by the act of congress, and the fifth selected by the four. The senate at the time was controlled by the republican party, the house of representatives by the democratic party, and there was thought to be danger of civil commotion in regard to certain questions likely to arise in the counting of the electoral votes of the several states in presence of the two houses. In these circumstances, a majority of each of the two political parties in congress, acting in a spirit of patriotism honorable to themselves and the country, agreed to create a commission to be constituted as above described, to which should be referred for judgment and decision the question which of two or more conflicting certificates received from any state of the votes cast by the electoral college of such state for president and vice-president in the election of 1876 was the certificate provided for in the constitution of the United States: the judgment of said commission in any matters referred to it, unless set aside by the concurrent action of the two houses of congress, was to be final. The proposed law was thereupon enacted, and in conformity with an understanding between the two political parties, the senate appointed 3 republicans, and 2 democrats, and the house of representatives 3 democrats and 2 republicans as members of the commission. Of the 4 associates of the supreme court who were named in the law, 2 were understood to be democrats and 2 republicans; and these selected, as the fifth associate justice to serve with them upon the commission, Mr. Justice Bradley, a republican. The commission was constituted as follows: Justices Clifford, Strong, Miller, Field, and Bradley; Senators Edmunds, Morton, Frelinghuysen, Thurman, and Bayard; and Representatives Payne, Hawton, Abbott, Garfield, and Hoar. Justice Clifford, by seniority of appointment to the bench, was by law president of the commission. As the counting of the electoral votes in the presence

of the two houses of congress proceeded according to custom, it was found that there were conflicting certificates from four different states—Florida, Louisiana, Oregon, and South Carolina; and the two houses were unable to agree in either case which certificate should be received as genuine. The certificates and accompanying papers were therefore successively referred to the commission, who proceeded to hear argument upon the questions involved. The result in each case was a decision of the commission, by a vote of 8 to 7—the vote following the exact line of party division in the body—that the certificate of the electoral votes cast for Hayes and Wheeler, the republican candidates for president and vice-president of the United States, was the certificate which contained the lawful electoral vote of said state, and that the other certificates were illegal and void. The republican senate concurred in this judgment in each case, while the democratic house of representatives dissented. The decision of the commission, therefore, according to the terms of the statute, became irrevocable, and the said electoral votes were counted accordingly; and Rutherford B. Hayes and William A. Wheeler were found duly elected, by a majority of one electoral vote, respectively president and vice-president of the United States for the term of 4 years, from the 4th of Mar., 1877. The controlling question before the commission was whether an electoral certificate being in form confessedly according to law, it was competent for congress or the commission to go behind the same and take evidence *abundant* in support of alleged irregularities and frauds committed before such certificate was issued. Upon this question the democrats in congress and in the commission took the affirmative, while the republicans took the negative.

ELECTORAL VOTES, as counted Monday, April 6, 1789, were as follows: George Washington, 69; John Adams, 34; Samuel Huntington, 2; John Jay, 9; John Hancock, 4; Robert H. Harrison, 6; George Clinton, 3; John Rutledge, 6; John Milton, 2; James Armstrong, Edward Telfair, Benjamin Lincoln, each 1.—The votes, as counted Wednesday, Feb. 13, 1793, were: George Washington, 132; John Adams, 77; George Clinton, 50; Thomas Jefferson, 4; Aaron Burr, 1.—The votes, as counted Wednesday, Feb. 8, 1797, were: John Adams, 71; Thomas Jefferson, 68; Thomas Pinckney, 59; Aaron Burr, 30; Samuel Adams, 15; Oliver Ellsworth, 11; George Clinton, 7; John Jay, 5; James Iredell, 3; Samuel Johnston, George Washington, John Henry, each, 2; Chas. C. Pinckney, 1.—The votes, as counted Wednesday, Feb. 11, 1801, were: Thomas Jefferson, Aaron Burr, each, 73; John Adams, 65; C. C. Pinckney, 64; John Jay, 1.—The votes, as counted Wednesday, Feb. 13, 1805, were: for *President*, Thomas Jefferson, 162; C. C. Pinckney, 14; for *Vice-President*, George Clinton, 162; Rufus King, 14.—The votes, as counted Wednesday, Feb. 10, 1813, were: for *President*, James Madison, 128; De Witt Clinton, 89; for *Vice-President*, Elbridge Gerry, 131; Jared Ingersoll, 86.—The votes, as counted Feb. 12, 1817, were: for *President*, James Monroe, 183; Rufus King, 34; for *Vice-President*, Daniel D. Tompkins, 183; John E. Howard, 22; James Ross, 5; John Marshall, 4; Robert G. Harper, 3.—The votes, as counted Feb. 14, 1821, were: for *President*, James Monroe, 231; John Q. Adams, 1; for *Vice-President*, Daniel D. Tompkins, 218; Richard Stockton, 8; Daniel Rodney, 4; Robert G. Harper, Richard Rush, each, 1.—The votes, as counted Feb. 9, 1825, were: for *President*, John Q. Adams, 84; William H. Crawford, 41; Andrew Jackson, 99; Henry Clay, 37; for *Vice-President*, John C. Calhoun, 182; Nathan Sanford, 30; Nathaniel Macon, 24; Andrew Jackson, 13; Martin Van Buren, 9; Henry Clay, 2.—The votes, as counted Feb. 11, 1829, were: for *President*, Andrew Jackson, 178; John Quincy Adams, 83; for *Vice-President*, John C. Calhoun, 117; Richard Rush, 83; William Smith, 7.—The votes, as counted Feb. 13, 1833, were: for *President*, Andrew Jackson, 219; Henry Clay, 49; John Floyd, 11; William Wirt, 7; for *Vice-President*, Martin Van Buren, 189; John Sergeant, 49; William Wilkins, 30; Henry Lee, 11; Amos Ellmaker, 7.—The votes, as counted Feb. 8, 1837, were: for *President*, Martin Van Buren, 170; William H. Harrison, 73; Hugh L. White, 26; Daniel Webster, 14; Willie P. Mangum, 11; for *Vice-President*, Richard M. Johnson, 147; Francis Granger, 77; John Tyler, 47; William Smith, 23.—The votes, as counted Feb. 10, 1841, were: for *President*, William H. Harrison, 234; Martin Van Buren, 60; for *Vice-President*, John Tyler, 234; Richard M. Johnson, 48; Lyttleton W. Tazewell, 11; James K. Polk, 1.—The votes, as counted Feb. 12, 1845, were: for *President*, James K. Polk, 170; Henry Clay, 105; for *Vice-President*, George M. Dallas, 170; Theodore Frelinghuysen, 105.—The votes, as counted Feb. 14, 1849, were: for *President*, Zachary Taylor, 163; Lewis Cass, 127; for *Vice-President*, Millard Fillmore, 163; William O. Butler, 127.—The votes, as counted Feb. 9, 1853, were: for *President*, Franklin Pierce, 254; Winfield Scott, 42; for *Vice-President*, William R. King, 254; William A. Graham, 42.—The votes, as counted Feb. 11, 1857, were: for *President*, James Buchanan, 174; John C. Fremont, 114; Millard Fillmore, 8; for *Vice-President*, John C. Breckinridge, 174; William Dayton, 114; A. J. Donelson, 8.—The votes, as counted Feb. 12, 1861, were: for *President*, Abraham Lincoln, 180; John C. Breckinridge, 72; Stephen A. Douglass, 12; John Bell, 39; for *Vice-President*, Hannibal Hamlin, 180; Joseph Lane, 72; Herschel V. Johnson, 12; Edward Everett, 39.—The votes, as counted Feb. 8, 1865, were: for *President*, Abraham Lincoln, 212; George B. McClellan, 21; for *Vice-President*, Andrew Johnson, 212; George H. Pendleton, 21.—The votes, as counted Feb. 10 1869, were: for *President*, Ulysses S. Grant, 214; Horatio Seymour, 80; for *Vice-President* Schuyler Colfax, 214; Frank P. Blair, Jr., 80.—The votes, as counted

Feb. 12, 1873, were : for *President*, Ulysses S. Grant, 286 ; Thomas A. Hendricks, 42 ; Horace Greeley, 18 ; Charles J. Jenkins, 2 ; David Davis, 1 ; for *Vice-President*, Henry Wilson, 286 ; B. Gratz Brown, 47 ; G. W. Julian, A. H. Colquitt, each, 5 ; J. M. Palmer, T. E. Bramlette, each, 3 ; W. S. Groesbeck, W. B. Machen, N. P. Banks, each, 1.—The votes, as counted Feb. 14, 1877, were : for *President*, Rutherford B. Hayes, 185 ; Samuel J. Tilden, 184 ; for *Vice-President*, William A. Wheeler, 185 ; Thomas A. Hendricks, 184.—The votes, as counted Feb. 9, 1881, were : for *President*, James A. Garfield, 214 ; Winfield S. Hancock, 155 ; for *Vice-President*, Chester A. Arthur, 214 ; William H. English, 155.—The votes, as counted Feb. 11, 1885, were : for *President*, Grover Cleveland, 219 ; James G. Blaine, 182 ; for *Vice-President*, Thomas A. Hendricks, 219 ; John A. Logan, 182.—The votes, as counted Feb. 13, 1889, were : for *President*, Benjamin Harrison, 233 ; Grover Cleveland, 168 ; for *Vice-President*, Levi P. Morton, 233 ; Allen G. Thurman, 168 ; as counted in 1893, for *President*, Grover Cleveland, 277 ; Benjamin Harrison, 145 ; J. B. Weaver, 22 ; for *Vice-President*, A. E. Stevenson, 277 ; W. Reid, 145 ; J. G. Field, 22 ; as counted Feb. 10, 1897, for *President*, William McKinley, 271 ; William J. Bryan, 176 ; for *Vice-President*, Garret A. Hobart, 271 ; Arthur Sewall, 149 ; Thomas E. Watson, 27.

ELECTORS, in the German empire, were those great princes who had the right of electing the emperor or king. In the earliest times under the Carolingians, the crown was hereditary ; afterwards, Germany became formally an elective monarchy, but the election was practically almost limited to the reigning family. Under the emperor Charles IV., the right of election became limited to the holders of the highest ecclesiastical and civil offices, some of which gradually became hereditary, and connected with territorial principalities, as in the case of the Hohenstaufens and of the dukes of Bavaria, Saxony, Suabia, etc. Thus there arose seven E., those of Mayence, Treves, and Cologne (as being the chief primates and chancellors of the empire), the E. of the Palatinate and of Bavaria long exercising the right by turns, and the E. of Brandenburg, Saxony, and Bohemia. From 1400 to 1708, the right was never exercised on the part of Bohemia, but otherwise no change took place from the middle of the 14th c. to the peace of Westphalia. By the peace of Westphalia, an eighth electorate was established, Bavaria and the palatinate being each allowed the full right ; and in 1692, a ninth was added, that of Brunswick-Lüneburg, but not without resistance by the E. and states of the empire, so that the new electorate was not fully recognized till 1710. In 1777, the number was again reduced to eight, the elector palatine inheriting Bavaria. The E. held a high and very peculiar position in the German empire. The Golden Bull describes them as "the seven pillars and lamps of the holy empire." They had certain important rights and privileges. They were leagued from the year 1398 for the maintenance of their freedom of election against the pope.

ELEC'TRA. See AGAMEMNON ; ORESTES.

ELECTRICAL EXECUTION. See CAPITAL PUNISHMENT.

ELECTRIC BELLS. The arrangement required to ring a bell or system of bells by electricity is simple. Some form of galvanic battery requiring little attention is placed in any convenient corner, and from it an insulated wire, with the necessary branches, is conducted to the various rooms, thence to perhaps as many bells, and, finally, back to the battery to complete the circuit. Each single bell is provided with a clapper, to which is fixed a piece of soft iron. Near this is fastened an electro-magnet, wound with a quantity of insulated wire, to which the main wire is connected, so that upon the passage of the signal current the magnet attracts the piece of iron fastened to the clapper, and the clapper strikes the bell. In this way any number of bells may be rung at once by sending a powerful current through the wire to which they are all connected. Such arrangements of bells are used very extensively for giving signals simultaneously in a number of rooms or buildings—for example, for striking the hours in all of the rooms of a school building ; for sounding alarms of fire throughout hotels or large buildings, etc.

Bells for continuous vibratory ringing, such as are used for summoning servants, etc., are of the same construction as those previously described, excepting that they are provided with a device for continuously vibrating the current while the bell is being rung. The wire, instead of being connected directly to the coil around the magnet, is connected to a post, against which the clapper rests after striking the bell. The coil is connected to the clapper, and the current passes through the post, and the clapper to the coil. When a signal on the wire causes the magnet to attract the clapper and strike the bell, the connection is immediately severed by the clapper leaving the post, and no more current can pass until the clapper has returned after striking the bell. Instantly when this occurs the connection is re-established, the clapper retracted, and the bell again struck. Thus a continuous ringing is produced as long as the person presses the calling button. This button, or "push button," now found in all well-appointed houses, is simply an ornamental cap covering the terminals of the wires leading to the bells. A slight pressure of the hand upon the button in the center forces the spring-shaped terminals of the wires into contact with each other, and allows the current to pass from the battery to the bell.

ELECTRIC BURGLAR ALARM. The use of wires and electric bells for giving alarms has been very successful. The simplest and most common arrangement consists in an electric bell with wires leading to all of the windows, doors, and other parts of the building to be guarded. The terminals of these wires are set in the framing of the windows and doors, so that if either is opened the action presses the springs together, and rings the bell in precisely the same way as in pressing the ordinary push button. See ELECTRIC BELLS.

All special kinds of the alarms for house protection consist of modifications in the method of making the contact, suitable for special purposes, such as laying sheets of tin under the carpet to make contact with the wires when the carpet is stepped upon. Means are also now generally introduced for indicating which window the signal comes from. This is done by leading the wires from each window separately through an annunciator, which shows through which wire, and consequently from which window the signal came. The entire wiring of houses is also frequently connected with the police office by wire, so that they are notified of any tampering with the house in the absence of its occupant. An ingenious method of protecting safes of great value by surrounding them with a wire net is also in extensive commercial use. The safe is completely enclosed in a wooden cabinet, the sides and doors of which are lined with a complicated network of fine wires. When the doors of the cabinet surrounding the safe are closed, the wires in the doors are connected with the rest of the wires by springs, and a continuous circuit is formed all around the safe, through which a delicate current is passed by the central office watchmen until the hour for reopening the safe. The complication of the wires is such that it would be impossible to disconnect any of them, or even substitute other wires without disturbing the delicate current which is kept on them. For further safety there is sometimes introduced a machine, which automatically changes the combination of wires during the night, at times known only to the watchmen.

ELECTRIC CLOCKS AND ELECTRIC TIME SYSTEM. Electricity is used in connection with clocks in several ways. It is used in place of a spring for actuating the clock; for moving the hands of a number of dummy clocks, in accordance with the motions of the hands of a standard clock; for sending the pendulum beats of a standard clock over wires to observatories, the shops of clock-makers, etc., and for periodically winding up the springs of ordinary clocks. For the first class—that of furnishing the motive power of clocks—the use is based upon the idea of securing greater uniformity of running by keeping the pendulum in motion by electricity instead of by spring or weight. For this purpose a great many special devices have been made, none of which are of particular importance. The use of electricity for keeping a number of clocks in agreement with a standard clock is of more importance. The pendulum of the standard clock is arranged to make an electric contact at each swing. By touching a spring, or better, by dipping its lower extremity into a trough of mercury at the lowest point of the swing, the pendulum and the trough being made the terminal of an electric circuit, an impulse is sent over the wire at every vibration of the standard pendulum. Upon this wire, in all desired buildings, are placed receiving clocks, consisting of a dial with hands fastened to toothed wheels. A magnet connected to the wire moves the wheel of the second hand one tooth as each impulse comes over the wire, thus keeping the second hand, and consequently the connected minute and hour hands, in positions corresponding exactly to those of the hands of the standard clock. This is the foundation of a considerable business known as time telegraphing. The use of the telegraph for simply transmitting taps representing the pendulum beats of a standard clock, for the use of observatories, is the most important division of the subject. The standard clock is arranged to close the circuit at each vibration, as previously described. The signals so produced are carried to clock-makers, observatories, etc., on suitable wires. In New York city, where this system is extensively used, and where several distributing circuits are required, the impulses of the standard clock are used to operate a multiplying instrument, which reproduces them at the same moment on a number of different wires.

The time-ball dropped at noon in New York city by the Western Union telegraph co. is an application of this system. At a few minutes before twelve, the standard clock in the Naval observatory at Washington is connected with one of the wires running to New York. At the same time the ball is hoisted to the top of the flag-staff in New York, and the hoisting rope is secured by a catch controlled by an electro-magnet. This magnet is connected to the wire to Washington. At the beat of twelve o'clock the pendulum itself of the clock at Washington sends the impulse which loosens the catch, and the ball on the flag-staff at New York falls. To guard against error due to slow descent caused by high winds, etc., the ball is arranged to strike a lever when it reaches the bottom, and send another signal back to Washington. This shows the Washington observer whether the ball was behind time in falling. If it is found to be late, it is immediately hoisted again as a signal of error.

The fourth class—namely, of clocks in which electricity is used to wind up the main spring periodically, is not of much importance. The object is to save the trouble of winding up, and secure a little greater uniformity of action. The spindle, ordinarily turned by the winding key, is provided with a small electric-motor actuated by a battery placed in any convenient closet. At uniform intervals the motor winds up the clock.

ELECTRIC FUSE is an apparatus for firing explosives in mines by means of the heating effect of electricity in a wire. The faculty of electricity of traveling quietly through a wire of large size and developing suddenly into intense heat when it meets a small wire, affords an excellent means of setting fire to explosive charges from a safe distance and at will. The use of electric fuses has therefore developed very rapidly, and they are now employed exclusively for firing all large submarine mines and torpedoes and for the majority of ordinary blasts. The fuse consists of a suitable small box, A, con-

taining a piece of wire, fig. 1, sufficiently fine to be made red hot by the current which is to be used. This wire is soldered to supports on the inside of the box, which are led through its walls from rigid connectors on the outside, to which the main cables, C, are attached. The object of arranging the fine wire in this manner is that the strain of the heavy connecting cables may be spent on the box and not on the fine wire within; the wire, being extremely thin, would be broken by even a very slight pull. The box is then filled with fine-grained powder, B, and the lid tied down. The wires of the fuse are then carefully joined to the long conducting wires which lead to the battery. They should be of copper and as thick as is convenient, so as to offer very little resistance; No. 16 gauge copper wire is a suitable size. The fuse is then introduced into the charge to be fired: if it is for a submarine explosion the powder is contained in a canister, the neck of which, after the introduction of the fuse, is carefully fastened by means of cement. When contact is made with the battery, which is effected through the intervention of a suitable key, the current traversing the platinum wire renders it incandescent, which fires the fuse, and thus the ignition is communicated to the charge in which it is placed.

The heating effect depends more on the size than on the number of the plates of a battery, for the resistance in the connecting wires is small. An iron wire may be melted by a single Wollaston's element (see GALVANIC BATTERY), the zinc of which is 8 in. by 6. Hare's battery has received its name, deflagrator, on account of its greater heating effect, produced by the large surface of its plates. Batteries for this purpose are now made up in boxes suitable for carrying, fig. 2, and provided with a key for starting the current which is to fire the mine.

When any circuit is closed, a definite amount of heat is produced throughout the entire circuit; and the amount of heat produced in any particular part of the circuit is greater the greater the proportion which the resistance of this part bears to the entire circuit. Hence, in firing mines, the wire to be heated should be of as small section and of as small conductivity as practicable.

These conditions are well satisfied by platinum, which has over iron the advantage of being less brittle, and of not being liable to rust. Platinum too has a low specific heat, and is thus raised to a higher temperature by the same amount of heat than a wire of greater specific heat.

On the other hand, the conducting wires should present as small a resistance as possible, a condition satisfied by a stout copper wire; and again, as the heating effect of any circuit is proportional to the square of the strength, and as this is directly as the electro-motive force and inversely as the resistance, a battery with a high electro-motive force and small resistance, such as Grove's or Bunsen's, should be selected.

ELECTRIC FISHES. See ELECTRICITY, ANIMAL.

ELECTRIC GAS LIGHTING. Electricity is very extensively used for lighting gas. In cases where the fixtures are out of reach, as in public halls etc., the wire is carried around the gas fixtures, being interrupted by a small break or space over each burner, so as to cause sparks at these points when a current is passed. For these lighters an electrical machine is provided which will generate sufficient electricity when its crank is turned to travel through the wire and jump over all the breaks. The sparks produced at the breaks are sufficient to set fire to the gas, which of course has been previously turned on, and all the burners are lighted at once. Another system which can be used only when each burner is within reach is employed where it may be desired to light each burner separately. It consists of a number of wires permanently connected to a galvanic battery and induction coil, each wire being led separately to one of the burners, and provided with a trigger for bringing the wires in contact, and so producing a spark when any particular burner is to be lighted. In this arrangement the closing of either one of the circuits at its burner produces a considerable spark by the inductive action of the induction coil, and ignites the gas.

ELECTRIC HEATING. Heat is developed by the passage of a current through any conductor, and the greater the resistance of the conductor the higher will be the temperature to which it is raised by the passage of the current. This is the principle upon



FIG. 1.

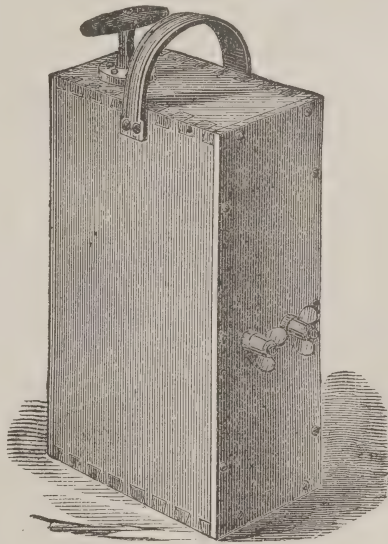


FIG. 2.

which all electric heaters are constructed. These heaters have come into considerable use since 1895 for both heating apartments, street cars, etc., and for cooking. Their general construction is as follows: Wire of high resistance is embedded in asbestos, fire clay, or other refractory material and built up into plates of large radiating surface, these being generally enclosed between iron plates. The current is passed through the resistance wire which at once becomes very hot and in turn heats up the refractory material and the enclosing iron. When the heater has been brought up to the required temperature the current may be turned all or partly off, and owing to the nature of the materials used the heater will retain its heat for a long time.

ELECTRICITY. The name given to the unknown matter or force, or both, which produces electric phenomena. Electricity, however produced, is believed to be one and the same thing, although static, voltaic or galvanic, magneto, thermo, and animal electricity are used as convenient terms to signify the origin of the electricity. They are no longer considered as different kinds of electric force. There have been numerous hypotheses as to the nature of electricity, the three most important of which are known as the single fluid theory, the double fluid theory, and Hertz's theory of electro-magnetic radiations, the latter theory being at the present time most generally accepted. The single fluid theory assumes that electricity is due to the presence of a single, tenuous, imponderable fluid, whose particles mutually repel each other but which are attracted by all matter and that every substance possesses a definite capacity for holding this electric fluid. When this capacity is just satisfied, no electrical phenomena are manifest; when less than this quantity is present the body becomes negatively excited, and when more, positively excited. Another view considers electricity to be due to differences of ether pressure, electricity being the ether itself and the pressure or electromotive force being the differences of ether pressure. The double fluid theory assumes the presence of two imponderable fluids, one negative and the other positive. The particles of positive fluid are assumed to repel one another, as do also the particles of negative fluid, but particles of opposite polarities attract each other. The two fluids are strongly attracted by matter, and when both are present in matter to an equal extent no electrical phenomena are present, as the two fluids neutralize each other, but when two bodies are rubbed together the fluids separate, one remaining in one body and the other passing to the other body. Hertz's theory assumes electricity to be due to vibrations of the ether, and his remarkable researches have shown that when an impulsive discharge is passing through a conductor, ether waves are propagated and radiated in all directions in the space surrounding the conductor. These waves are similar in all respects to those of light except that they are much longer. These electro-magnetic waves possess the same velocity and the same characteristics as light vibrations. When impulses of electricity pass from one end of a long conductor to the other, the pulses are supposed to travel through the universal ether surrounding the conductor rather than through the conductor itself. In the free ether the velocity is the same as that of light, but in the intermolecular ether of conductors the velocity depends upon the nature of the medium.

Friction between two substances always produces electrical separation. In general when two bodies are thus electrified that one becomes negative whose particles are more easily removed by friction. Differences of temperature also affect the electrical condition of bodies, a warm body being usually negative when rubbed on a cold piece of the same substance. It has been found that the degree of electrification produced by rubbing two substances together is independent of the pressure and the amount of surface in contact but depends on the materials and the velocity with which they are rubbed against one another. The amount of the charge is not proportional to the actual mechanical friction, so it is doubtful if the friction is the real cause of electrification.

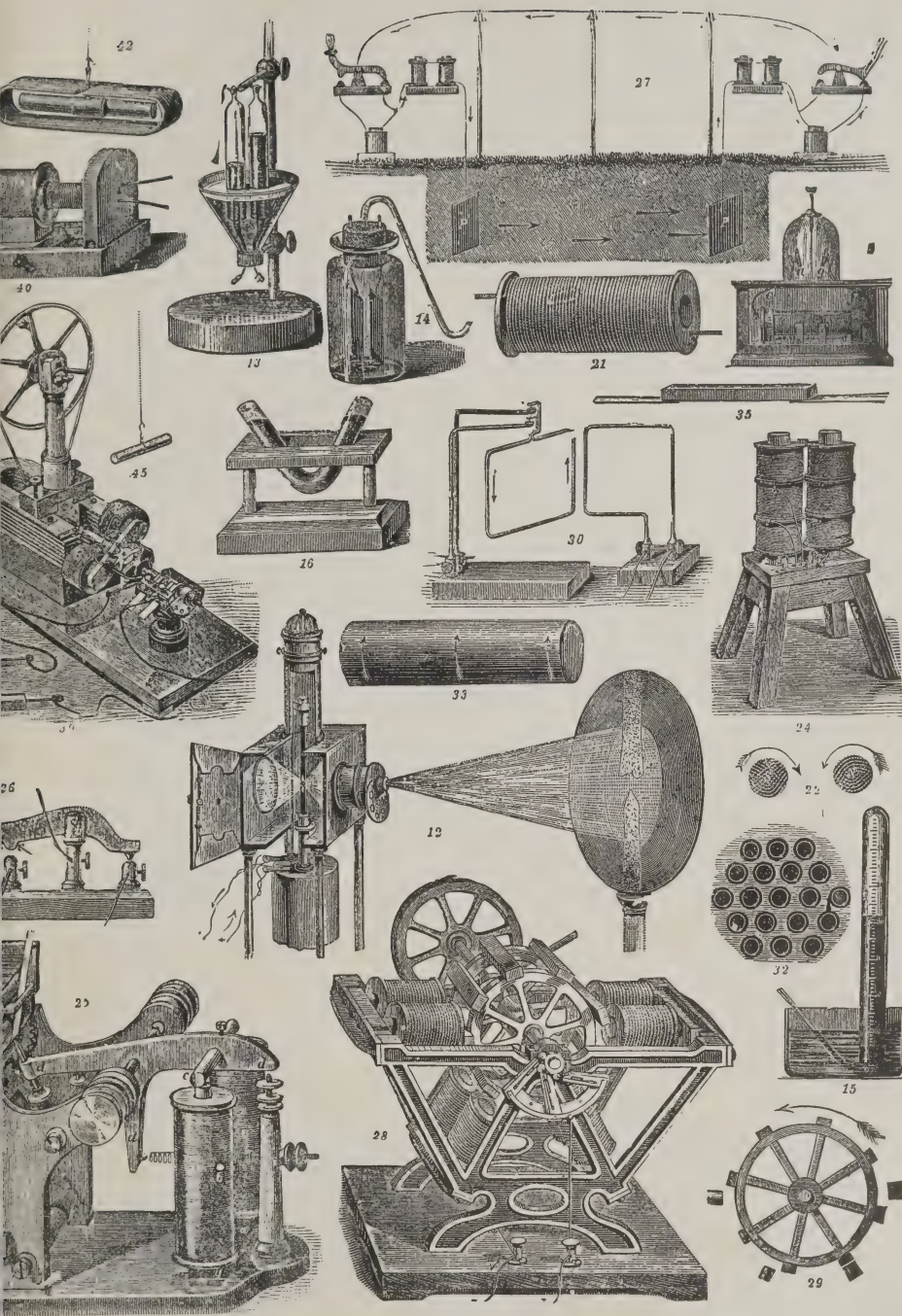
Incidentally, the minute quantities of electricity produced in this way have enormously high pressure enabling them to form sparks of considerable length; and the identity of different kinds of electricity was not known till the time of Franklin, when it was proved that the sole difference was one of quantity and pressure. See **ELECTRICITY, STATIC.** Electricity of the continuously flowing form was first derived from galvanic batteries (q. v.), and its properties and applications as far as developed with these sources, were known and treated under the title of Galvanism. The production of electricity from chemicals, however, was too expensive to permit of its being extensively used in industrial processes. The invention of dynamo-generators, first known as magneto-generators (q. v.), during the last twenty years, has reduced the cost of electricity to one hundredth of its cost from chemical batteries, and it is now used extensively in many arts. The wide usefulness of electricity results from the peculiarity of its powers or properties, and its possession of them in a very high degree. It travels with incredible velocity. This has rendered the telegraph possible. It attracts objects at a distance, hence its value for moving the clappers of bells, running motors, etc. It decomposes chemicals, giving us electrolysis, electro-plating, electro-chemistry, electro-metallurgy, etc., and the analysis of compounds previously unknown. It is readily convertible into heat in a wire, giving us the electric light. It is attractive to the engineer as a force because its laws of action are very accurate and well understood. Any results of electrical action can therefore be predetermined with a degree of certainty exceeding that found in any other branch of engineering.

$$\text{Current} = \frac{\text{Pressure}}{\text{Resistance}}, \text{ or Ampères} = \frac{\text{volts}}{\text{ohms.}}$$

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ELECTRICITY.—1. Galvani's experiment on frog's legs. 2. Dry pillar. 3. Ground return column. 9. Generation of heat by galvanic current. 10. Galvanic incandescence. 16. Electrolysis of saline solutions. 17. Galvano-plastic. 18. Oersted's fundamental magnetic polarity. 23, 24. Electro-magnets. 25-27. Electric telegraph (25, Sounder; *b*, battery; *p*, ground-plate). 28, 29. Electro-magnetic motor. 30. Dynamic attraction. 35, 36. Thermo-electric elements. 37, 38. Thermo-electric inductor. 42. Electric abater. 43. Ground inductor. 44, 45. Diamagnetism.



1. Galvanic element. 2. Columnar electroscope. 3. Galvanic element. 4. Cups or cells. 5. Bunsen's
 6. Galvanic light. 7. Decomposition of water by galvanic current. 8. Voltameter.
 9. Tangent-bussol. 10. Multiplier. 11. Magnetic coil. 12. Law of
 attraction and repulsion between two parallel wires with Morse or Graham alphabet; 13. Key; 14. Circuit complete; 15. Key;
 16. Electro-dynamic test. 17. Solenoid. 18. Ampère's theory of magnetism. 19. Electro-magnetic machine. 20. Induction apparatus. 21. Rumkorff's spark

This is Ohm's law. By transposing the terms of the equation, we may get an expression for either of the three elements—current, pressure, or resistance, in terms of the other two. This relation holds true, and is completely accurate, in every possible case and condition of practical work. This remarkable precision and definiteness of action renders possible the creation of an extensive art of electrical testing, by which we are enabled not only to make accurate measurement of electrical apparatus, but to make determinations in other subjects through the agency of electricity. For example, when an ocean cable is injured or interrupted, the precise location of the trouble is ascertained by measuring the electrical resistance of the parts of the cable on each side of the break, or by observing the quantity of electricity which the parts of the cable will hold, etc. See Kempe's *Electrical Testing*.

Electricity and the capacities of electrical apparatus are measured and the magnitudes of the measurements expressed in the following convenient electrical units.

- Ampère = unit of current. The amount of current at unit pressure that would flow through a circuit of unit resistance per second, or such a current as will deposit .00111815 gramme of silver per second.
- Volt = unit of electric pressure. The pressure that would cause a current of one ampère to pass through a circuit of unit resistance. The value of the electromotive force of a current is called its voltage.
- Ohm = unit of electrical resistance. The ohm is a resistance equal to that of a column of mercury of 106 centimeters in length, and one square millimeter of cross section, at 0° C. temperature.
- Coulomb = unit of quantity. The quantity of electricity that flows per second past a cross section of a conductor conveying one ampère.
- Farad = unit of electrical capacity. The capacity of a conductor that would enable it to hold one coulomb under a pressure of one volt.
- Joule = unit of electric work. The work required to raise a coulomb one volt in pressure, or .73732 foot-pound.
- Watt = unit of electric power, = 1 joule per second $\frac{1}{748}$ horse-power. Watts = ampères \times volts.

The conversion of electrical energy into energy of other kinds for practical use, is accomplished by taking advantage of the peculiar properties of electricity in the different ways in which it can be done with especial advantage. It should be remembered that electricity is only utilized as a means of transmitting energy from one point to another, and is not a form of energy itself. It may be compared to the belt between a steam engine and a machine, which serves to transmit the power of the engine over to the machine when the power is utilized. In the same way the electric current transmits the power of an engine or any other prime mover over any distance through conductors, at the other end of which the power is utilized in the form of heat, light or mechanical energy. The relation between electricity and heat is very close, hence, the transition from electricity to heat is extremely simple. Upon this fact and principle the processes which depend upon the conversion of electricity into heat are founded. The chief example is the electric light (q. v.), which is produced by converting an electric current into intense heat by means of the resistance of the conductor at the desired point. The relation of light to heat and electricity is also known to be very close, the difference being simply a matter of different rates of vibration. The class of uses of electricity for producing mechanical power depends upon its faculty of attraction, which is now explained by the following theory: A wire through which a current of electricity is passing is found to be surrounded always with a circular region of attractive force. The attraction is found to exist in the form of rings around the wire; and lines so drawn to represent the position of these imaginary attractable objects, are called "lines of force" (see COMPOSITION OF FORCES). These imaginary lines, or the direction in which a current-carrying wire attracts, are invariably found to be at right angles to the wire. A magnet or magnetic needle placed near the wire will swing around and place itself at right angles to the wire and parallel to these lines. This shows that the direction in which magnetism acts is at right angles to the direction in which electricity acts—that is, the electric current creates, at right angles to itself, an artificial magnetism. The lines of force around a wire are found to be magnetic lines, and to have strong power of attraction, as if they were magnets laid crossways to the wire. A conclusion from this is that if we wind a quantity of wire on a cylinder of soft iron, since the axis of the cylinder will be at right angles to all of the wire, we shall find that the cylinder becomes strongly magnetic, and this effect increases in proportion to the number of turns of wire about the cylinder and the current which is passed through it. This is the electro-magnet, which, together with the solenoid (q. v.), is the foundation of most electrical apparatus, such as regulators, telegraph instruments, motors, etc. It is seen from this that the relation between electricity and magnetism is very close. According to Ampère's theory, magnetism consists in the circulation around a bar of iron of minute electric currents which throw out lines of force, and produce the attraction as above described, which in this case we happen to call magnetism.

The breaking up of chemical unions by electrical action, giving rise to the arts of electro-plating, electro-chemistry, etc., remains to be considered. The subject has not as yet been extensively investigated. The effects probably depend upon the disturbing effect which the molecular or atomic motions known as electricity produce upon the chemical unions. The vibrations of heat are a common means of producing

chemical change or separation; and the vibrations of electricity probably act in the same way. The production of electricity by the action of chemical batteries also depends upon the conversion of the energy of chemical affinity into the energy of electrical vibrations in some way similar to its easy conversion into heat. It is known also that the amount of electricity produced will in every case be proportional to the affinity of the chemicals about to combine. See titles under ELECTRIC, ELECTRO; also MAGNETO ELECTRIC MACHINES, TELEGRAPH, etc. See Gordon's *Electricity and Magnetism* (London); Sprague's *Electricity: its Theories, Sources, and Applications* (London); Fleeming Jenkin's *Electricity and Magnetism* (New York); Ganot's *Physics*; Sylvanus Thompson's *Dynamo-Electric Machines* (London); Kempe's *Electrical Testing* (London); *The Electric Motor and its Applications*, by Martin and Wetzlar; Caillard, *Electricity* (1891); Brackett, *Electricity in Daily Life* (1891).

ELECTRICITY, ANIMAL. In this article we shall notice (1) the electricity developed by the so-called electrical fishes; (2), the electric properties of muscle and nerve; and (3) the electric phenomena of membranes and glands.

1. Although the peculiar powers of the torpedo and of the gymnotus were well known to the ancients, the first scientific discovery in this department of electricity was the determination of the electrical character of the shock of the torpedo by Walsh in 1772 ("Of the Electric Properties of the Torpedo," *Philadelphia Transactions*, 1773). From that date to the present time, the electric organs of certain fishes, which will be immediately mentioned, have been made the object of special study by some of our greatest anatomists and physiologists, among whom may be named John Hunter, Galvani, Rudolphi, Knox, Valentin, Pacini, Matteucci, Goodsir, and Jobert de Lamballe, who has published a special work, entitled *Des Appareils Electriques des Poissons Electriques* (Paris, 1858), accompanied by a magnificent volume of plates.

The species of electrical fish which has been the longest known, is the *raia torpedo*, or electric ray, which has much the appearance of a skate. It is common in the bay of Biscay and in the Mediterranean, but is seldom met with on the shores of Britain. It grows to a considerable size, and is often above 80 lbs. in weight. It is now usually regarded as not a true ray, but as constituting a distinct genus, to which the terms *torpedo* and *narcine* have been applied by different naturalists—the latter name being derived from the Greek word *narke*, which was given to it by Aristotle. The electric organs or batteries are placed on each side, in the spaces between the pectoral fins, the head and gills. See TORPEDO. Each battery consists of a number (varying according to the age of the animal) of hexagonal prisms, which extend perpendicularly between the dorsal and abdominal surfaces, and present somewhat of a resemblance in shape and arrangement to the cells of a honey-comb. Four nerves, which are branches of the fifth and eighth cerebral pairs, go to each battery; and the nervous center of the electrical apparatus is, therefore, the *medulla oblongata*. Several species of *narcine* are known, all of which possess the electric property.

The ordinary rays and skates possess an organ in the tail which closely resembles the electric organ of other fishes, but its function is still doubtful; and in opposition to the view of its electric nature, it may be mentioned that while Dr. Starke (to whom the discovery of this organ is due) found it in the tail of every species of true ray, both professor Goodsir and M. Robin ascertained it to be wanting in the tail of the *torpedo*.

The *gymnotus electricus*, or electrical eel, is little inferior in celebrity to the *torpedo*. It is common in all the streams which flow into the Orinoco, and is generally procured from Surinam. It is usually 3 or 4 ft. in length, but may reach a length of 6 feet. The whole of its viscera lie close to the head, and the anal aperture is only 2 in. behind the mouth; all the rest of the body inferiorly is occupied by the electrical apparatus, which consists of four batteries—viz., two on either side, and one above the other—the uppermost or dorsal being the larger. These batteries consist of a number of piles placed horizontally in a direction from head to tail; and from this circumstance, as well as from their peculiar structure, they were compared by Redi to galvanic troughs. The number of these piles in the greater battery, is from 30 to 60; in the lesser, from 8 to 14. These batteries are supplied by about 224 pair of nerves on each side, derived from the inferior or motor roots of the spinal nerves.

Humboldt, both in his *Personal Narrative* and in his *Views of Nature*, gives a graphic account of the mode in which the Indians catch wild horses through the agency of the gymnotus. Faraday made numerous observations on a specimen 40 in. in length, which was exhibited in the Adelaide gallery some years ago. He calculated that, at each medium discharge, the animal emitted as great a force as the highest charge of a Leyden battery of 15 jars, exposing 3,500 sq.in. of coated surface. The strongest shocks were obtained by touching the fish simultaneously near the head and near the tail; scarcely any shock being felt if the hands be placed one on each side of the fish, at the same distance from either extremity; the amount of the shock, as might have been expected, varying with the length of the column which produces it. The shocks have sufficient power to stun, or even to kill fish; and the same discharge produces a more powerful effect upon a large fish than it does upon a small one, since the larger animal exposes a larger conducting surface to the water, through which the electricity is passing, and, consequently, it receives a more violent shock. On one occasion, when a live fish was put into the tub, which was 46 in. in diameter, the animal was seen to coil itself into a

semicircle, the fish lying across the diameter ; this was the most favorable position for giving the strongest shock ; an instant afterwards, the fish floated dead upon its side, and was then devoured by the *gymnotus* (q.v.).

The shock of both the *torpedo* and the *gymnotus* gives rise to momentary currents of sufficient intensity to deflect the galvanometer, to magnetize a needle, and to decompose iodide of potassium ; and from both fish sparks have been obtained.

We next come to the electrical fishes of the genus *malapterurus*. The only fish of this genus whose electrical organs have been examined and described is the *M. electricus* of the Nile, called raash or thunder-fish by the Arabs. It has barbules dependent from the region of the mouth, like the common barbel ; and its smooth skin is diversified with irregularly shaped spots. Its length is from 8 to 14 inches. The batteries are two in number, "separated," to adopt Prof. Goodsir's description, "but at the same time intimately connected to one another in the mesal plane along the dorsal and ventral margins of the body, so as to form a continuous layer of a gelatinous consistence closely adherent to the skin, and enclosing as in a sac the entire animal, except the head and fins." The structure of these batteries is very complicated, and we shall not attempt to explain it.

In the year 1854, a new electrical fish became known to us, belonging to the same genus as the one just described. It is found in the muddy brackish water of the river Old Calabar, which empties itself into the bight of Benin. The fish has accordingly been named the *malapterurus Beninensis* by Mr. Andrew Murray, who has described and figured it in the *Edinburgh Philosophical Journal* for July, 1855. It is much smaller than the Nilotic species, and the formulæ of the number of fin-rays differ in the two species. We believe that this new species was dissected by the late Prof. Goodsir, but we are not aware that the results were ever published. See MALAPTERURUS.

Our limits will not allow of our noticing the successive opinions which have been entertained regarding the action of the electric organs in fishes. There does not seem to be room for doubt that the electrical organs of fishes have been developed from muscular tissue. In order to generate an electric current it is only necessary to establish a difference of electrical pressure, and we know that muscular contraction does produce such a pressure. A gymnotus in the possession of M. d'Arsonval, of Paris, was able to give a discharge of about 2 ampères at over 100 volts pressure. The electrical organ was situated underneath the animal, the positive pole being at its head and the negative at its tail. In giving violent shocks the animal rolls itself into a circle, and completes the circuit from its head to its tail through the object attacked. The discharge is at the will of the animal, which may be touched, if not irritated, without causing a discharge.

2. The study of the electrical properties of muscle and nerve dates from the period (1786-94) in which Galvani made his great discoveries. Having first ascertained that contractions were produced by electricity in the muscles of a recently killed frog, he subsequently found that similar contractions occurred when two dissimilar metals in contact with one another were brought in contact with the nerve and muscles respectively of the frog's leg. The experiment may be readily made in the following manner : Expose the crural nerve of a recently killed frog ; touch it with a strap of zinc, and at the same time touch the surface of the thigh with one end of a bit of copper wire. At the moment that the other end of the wire is brought in contact with the zinc, the limb is convulsed ; but the convulsions cease when the two metals are separated from each other, though they are still in contact with the animal tissues ; and they are renewed when the zinc and copper are again made to touch. At first, Galvani believed that the contractions were due to electricity evolved by the metals, but finally he concluded that it is produced by the animal textures themselves. No important step in this direction was afterwards taken till 1827, when Nobili, with his improved galvanometer (q.v.), discovered the electric current of the frog. He found that when the circuit of the nerve and muscles of the leg is closed by the instrument, a deviation of the needle, to the extent sometimes of 30°, occurs, due to a current which passes in the limb from the toes upwards, and which could be increased when several frogs were simultaneously included in the experiment. Undoubted proof was thus afforded that electricity is developed in connection with muscle and nerve.

The researches of Matteucci, confirmed by the subsequent investigations of Dubois Reymond, have demonstrated the existence of what is termed the *muscular current* in living animals. They show that in the living animal an electrical current is perpetually circulating between the internal portion and the external surface of a muscle—a current due probably to the chemical changes which are always occurring in the animal tissues. This muscular current ceases in warm-blooded animals in a very few minutes after their death ; but in cold-blooded animals, as in the frog, it continues for a much longer period. The following is perhaps the best experiment for showing the existence of the muscular current : Five or six frogs are killed by dividing the spinal column just behind the head ; the lower limbs are removed, and the integuments stripped off them ; the thighs are next separated from the legs at the knee-joint, and are cut across transversely. The lower halves of these prepared thighs are then placed upon a varnished board, and so arranged that the knee-joint of one limb shall be in contact with the transverse section of the next, and thus a muscular pile is formed, consisting of ten or twelve elements ; the terminal pieces of this pile are each made to dip into a separate small cavity in the board, in which a little distilled water is placed. If the wires of a sensitive galvanometer be attached to a pair of platinum plates, and these plates be placed simultaneously, one into each cavity in connection with the muscular pile, a deviation of the galvanometer needle will be ob-

served in a direction which indicates the existence of a current passing from the center or cut transverse surface of the muscle towards its exterior.

Dubois Reymond has subsequently shown by the use of extremely sensitive instruments, that even the smallest shreds of muscular tissue exhibit proof of the existence of such a current; and he has established the general law, that any point of the natural or artificial *longitudinal* section of a muscle is positive in relation to any point of the natural or artificial *transverse* section.

3. The electrical relations of membranes and glands have been especially studied by Mr. Baxter, whose "Experimental Inquiry, undertaken with a View of ascertaining whether any or what Signs of Current Electricity are manifested during the Organic Process of Secretion in Living Animals," is published in the *Philosophical Transactions* for 1848 and 1852.

His chief conclusions regarding the electrical condition of the intestinal mucous membrane are:

1. When the electrodes of a galvanometer are brought into communication—one with the mucous membrane of the alimentary canal, and the other with the blood flowing from the same part—a deviation of the needle takes place, indicating that the mucous secretion and the blood are in opposite electrical states.

2. The effect ceases after death, and may be considered as arising from the decomposition of the blood—viz., from the changes which occur during the formation of the secreted product and venous blood.

His conclusions regarding the electrical relations of the secretions and blood of the liver, kidney, and mammary gland, are as follows:

1. During biliary secretion, the bile and the venous blood flowing from the hepatic veins are in opposite electrical states.

2. During urinary secretion, the urine and the venous blood flowing from the renal vein are in opposite electrical states.

3. During mammary secretion, the milk and the venous blood flowing from the mammary veins are in opposite electrical states.

For further information on this subject, the reader is referred to Matteucci's *Lectures on the Physical Phenomena of Living Beings*, translated by Dr. Pereira; to his series of "Electro-Physiological Researches," published in the *Philosophical Transactions*; and to Dubois Reymond's *Untersuchungen über Thier-Electricität*.

ELECTRICITY, DEATH CURRENT OF. This term is exceedingly vague, as the exact amount of current necessary to cause death has not been satisfactorily determined. It also depends upon what path the current takes through the body, and what vital organs lie in this path. It depends both upon the ampères and the voltage of the current. Incandescent light circuits of about 100 volts are not at all dangerous to handle, although there might be a possible danger in making very large contacts with the moist skin, so that a large current was passed through some vital organ of the body. An alternating current of about 1500 volts and 120 alternations per second is used in electrocution. But with a higher voltage and number of alternations the danger seems to decrease. In the experiments of Tesla he has passed currents of 1,000,000 volts and 1,000,000 alternations through his body with perfect safety. See **CAPITAL PUNISHMENT**.

ELECTRICITY, DIRECT CONVERSION OF. The problem of producing electricity directly by the combustion of coal, precisely as heat is obtained, is one of the most promising fields for future investigation. Since, as has been stated, electricity is now considered to be a form of vibration similar to that of heat, there seems to be no absolute obstacle in the way of burning coal directly into electricity.

At present we are dependent upon the steam-engine to drive the mechanical generator of electricity, and there is at once a loss in this first step of 90 per cent. of the energy of the coal, while the dynamo-electric generator loses only about 10 per cent. of the power brought to it by the belt from the steam-engine. The solution of this problem will greatly cheapen electricity. It would entirely revolutionize the arts, and the furnace and electric motor would probably displace the steam-engine and boiler.

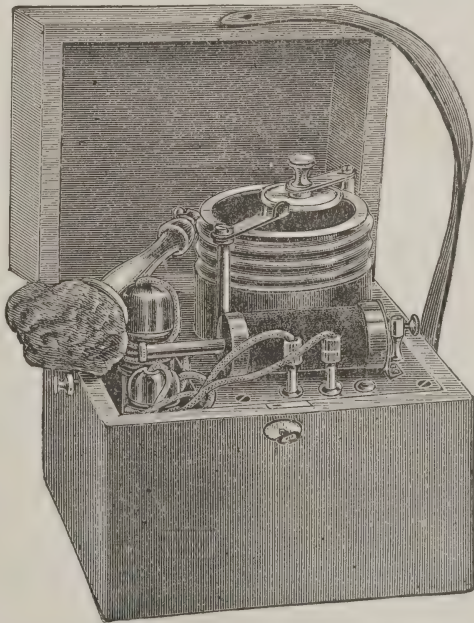
ELECTRICITY, MEDICAL. Electricity, in its application to medicine and surgery, is employed in the following forms: 1. *Electrization*, by electricity of high tension, as obtained by friction of glass in the common electrical machine; 2. *Galvanization*, by current electricity of quantity, as set in motion by the voltaic battery; and 3. *Faradization*, by induced or interrupted currents, produced by magneto-electric or electro-magnetic induction coil machines.

Electrization.—Frictional electricity is now seldom employed in therapeutics, on account of the inconvenience experienced in the management and insulation of the glass or common electrical machines; yet the powerful stimulant and counter-irritative effect of sparks drawn from the affected parts is still recommended in paralytic affections, in chorea and other nervous diseases; and the succussion produced by shocks from the Leyden jar is undoubtedly the most effectual remedy in amenorrhœa.

Galvanization.—The effect of passing a voltaic current from a battery of many elements through the living body, is to cause a shock or contraction of the muscular tissues, succeeded with a distinct interval by a momentary sensation or flow of heat due to the electric and nervous (?) polarization of the circuit. During the continued passage of the current, slight tingling sensations and elevation of temperature are observed, especially in those parts in contact with the electrodes or poles, which become painful and congested, and finally inflamed and ulcerated. On opening the circuit, the depolarization of

the tissues which ensues is accompanied by a second shock and subsequent glow of heat, which are powerful in proportion to the length of time the circuit has remained closed. The amount of contraction in the muscle has relation to the *intensity* rather than the *quantity* of electricity passed through it—that is, to the rapidity with which the electric state is changed, rather than the amount of that change. The calorific effect of the current is proportionate to its *quantity*. Thus, a single pair of plates of platinum and zinc, an inch square (charged with chromic acid), will, under ordinary circumstances, exercise little or no physiological effect; but if the same pair be divided so as to form a compound battery of twelve smaller pairs, its application will be attended with the shocks and calorific effects described. A further division into 24 or more pairs increases the shock, but the sensation of heat becomes less marked. With certain limitations, therefore, the shock of the battery depends on the number of its elements, without regard to their size, its calorific effect to the area of its plates. The nerves of the organs of special sense, when subjected to galvanization, evidence phenomena peculiar to their proper function. Thus, the passage of the current through the retina is attended by the sensation of a flash of light, which is bluish when the positive pole is applied to the eye, and tinged with the complementary orange when the force is transmitted in the opposite direction. A faint sensation of light is also perceived when the skin of the face or mucous membrane of the mouth is galvanized, caused by reflex action from the sentient filaments of the fifth pair of nerves which are distributed to those parts. Galvanization of the ear gives rise to bubbling, ringing, or cracking sounds, and occasionally to distinctly musical tones; that of the tongue, to an acid taste under the positive pole, and an alkaline taste under the opposite one; that of the lining membrane of the nose, to sneezing and a peculiar smell, which differs with the direction of the current. The continuous gentle action of small single and compound voltaic arrangements has been more or less successfully employed in paralysis, amaurosis, and neuralgia, either by application to the surface of the body, or carried directly to the affected parts by needles thrust into them (galvano-puncture). More powerful batteries, consisting of six or eight cells of the carbon battery of Bunsen, the nitric acid battery of Grove, or the platinized zinc battery of Strethill Wright, have been used to coagulate the fibrinous contents of aneurismal sacs—to decompose calculi in the bladder (?)—and to render platinum plates or wires incandescent, for the surgical cauterization of internal parts not otherwise easily accessible.

Faradization.—The instruments employed for the exhibition of interrupted or induced currents are the magneto-electric and the electro-magnetic coil machines. In the first, the electricity is set in motion in a long thin wire coiled round a bar of iron or keeper maintained in constant whirling motion before the poles of a permanent horseshoe magnet, the magnet with every half revolution magnetizing the keeper alternately in opposite directions, while the constantly recurring magnetism of the keeper in its turn induces impulses of alternating currents in the coil-wire. The disadvantages of the magneto-electric machine, therefore, are, that it is not self-acting, and that its currents pass alternately in opposite directions. In the electro-magnetic machine, the thick coil-wire, wound over a core of iron, is made to conduct the current from a single voltaic pair which magnetizes the iron. When the battery-current is interrupted, the iron core becomes instantly demagnetized, and this change in its magnetic condition is attended with a rearrangement of the polarity of the coil-wire, and the passage through it of an impulse of induced electricity. By a simple arrangement, the magnetized iron is made to interrupt and renew the battery-current; and the machine, thus rendered self-acting, furnishes a rapid succession of momentary currents passing in the same direction, and of much greater quantity than those of the magneto-electric machine. Currents higher in tension, less in quantity, and more resembling frictional electricity, may be obtained from an additional coil ("secondary coil") of very thin and long wire wound over the former one, but they are not of much importance in medical practice. The accompanying figure represents the latest form in



which this useful apparatus for administering electricity for medical purposes is constructed for physicians' use.

The induction coil described above is placed in a suitable case, of a shape convenient for carrying, and in addition, a battery of two Smee's cells, permanently connected to the coil. This furnishes the power for operating the coil.

The physiological action of the coil-machines is equivalent to that of rapidly repeated discharges from a large Leyden jar weakly charged; and as the time engaged by the passage of each impulse in the succession of discharges is too short to permit the development of any decided polarization of the tissues, the distinct calorific effects which accompany the commencement and cessation of the *galvanic* discharge do not occur.

Faradization is applicable to a great variety of chronic diseases in which a deficiency of functional energy exists; in paralytic affections unconnected with active disease of the nervous centres, mercurial and lead palsy, and in that produced by rheumatic affection and exposure to cold; in nervous or hysterical aphonia, or loss of voice; in amaurosis (q.v.), when not connected with inflammatory or organic disease; in nyctalopia, or night-blindness; in amenorrhœa, when uncomplicated with active disease of the uterus; in suppression of the lacteal secretion; in constipation (q.v.) from deficiency in the peristaltic action of the intestines; in paralysis of the bladder (?), and with very doubtful effect in the induction of uterine contraction; in suspended animation from drowning, narcotic poisons, etc. In spasmodic and neuralgic diseases the benefit of faradization is less to be depended on; but a very gentle and long-continued application of it has afforded relief in the distressing starting of the lower limbs which occurs in paraplegia or paralysis of the lower half of the body; in "writers' cramp" and spasmodic forms of hysteria; in tic douloureux, sciatica, and hysterical neuralgia. Faradization by electro-puncture has been successfully employed to induce the union of non-united fractures, the currents being passed between the disjoined ends of the bones; and to excite absorption in bronchocele and hydrocele, though with more doubtful effect. The intense sparks from the "secondary coil" have been used in place of those obtained by frictional electricity; and lastly, it has been proposed to employ the brilliant streams from powerful induction coils confined in fine "vacuum tubes" of glass, to illuminate internal parts of the body for the performance of surgical operations, etc.

The possibility of introducing certain medicines into the system by electricity is shown by the following experiment made in France in 1886. The negative pole of a battery was applied over a rubber plate moistened with a solution of iodide of potassium and placed upon the surface of the body. When the positive pole was placed on the part to be affected, the iodide left the potassium and passed rapidly through the tissues to the positive pole.

ELECTRICITY, EVAPORATION PRODUCED BY. In July, 1891, Prof. William Crookes made public certain discoveries regarding a principle which he calls Electrical Evaporation. The first of these discoveries is represented by the scientific toy called the Radiometer, a small mill enclosed in a vacuum. The metallic vanes of this mill are set in motion by solar rays, mechanical motion being here the outcome of radiant energy. A powerful stream of electricity is then passed through two platinum wires into the vacuum. It is well known that with any vacuum a discharge of electricity takes place between the platinum wires; but by carrying the exhaustion to an extent previously unattempted a new phenomenon appears. Reduced to a small fraction of their previous number, molecules fly from the electrified points through considerable distances before they produce light. A dark space in the exhausted vessel now appears, which is occupied by matter in rapid motion. Matter in this condition represents a fourth condition of matter, as distinct from gas as gas from liquid or liquid from solid. It is found that the stream of molecules can be deflected into a curved line by a magnet, and that small mills inside the vessel can be set in motion by the application of a magnet to the outside of the glass. Now, during the discharge in vacuo it is known that on the inside of the glass near the platinum wires, and especially near the negative pole, a deposit of metallic platinum is formed. It is clear that the electrical energy produces a volatilization of the metal. This is properly described as *electrical evaporation*.

ELECTRICITY, STATIC. Thales, about 600 B.C., refers in his writings to the fact that amber, when rubbed, attracts light and dry bodies. This was the only electric fact known to the ancients. The science of electricity dates properly from 1600 A.D., when Gilbert of Colchester published a book, entitled *De Arte Magnetica*, in which he gives a list of substances which he found to possess the same property as amber, and speculates on magnetic and electric forces. He is the inventor of the word, which he derived from the Greek word *electron*, amber. Otto von Guericke, burgo-master of Magdeburg, in his work *Experimenta Nova Magdeburgica* (1672), describes, among his other inventions, the first electric machine ever made, which consisted of a globe of sulphur turned by a handle, and rubbed by a cloth pressed against it by the hand. Hawksbee (1709) constructed a machine in which a glass cylinder, rubbed by the dry hand, replaced Guericke's globe. Grey and Wehler (1729) were the first to transmit electricity from one point to another, and to distinguish bodies into conductors and non-conductors. Dufay (1733-45) showed the identity of electrics and non-conductors, and of non-electrics and conductors, and was the first to discover the two kinds of electricity and the fundamental principle which regulates their action. Between 1733 and 1744, much attention was given in Germany to the construction of electric machines. Up to this time, notwithstanding the inventions

of Guericke and Hawksbee, the glass tube rubbed by a piece of cloth, which Gilbert first introduced, was used in all experiments. Boze, a professor at Wittenberg, taking the hint from Hawksbee's machine, employed a globe of glass for his machine, and furnished it with a prime conductor. Winkler, a professor at Leipsic, was the first to use a fixed cushion in the machine. The Leyden jar was (1746) discovered accidentally at Leyden by Muschenbroek; but the honor of the discovery has been contested also in favor of Cuneus, a rich burgess of that town, and Kleist, canon of the cathedral of Camin, in Pomerania. Franklin (1747) showed the electric conditions of the Leyden jar, and (1752) proved the identity of lightning and electricity by his kite experiment. The last was performed with the same object about the same time, and quite independently, by Romas of the town of Nerac, in France. In 1760, Franklin made the first lightning-conductor. Canton, Wilke, and Æpinus (1753-59) examined the nature of induction. Ramsden (1768) was the first to construct a plate-machine, and Nairn (1780) a two-fluid cylinder-machine. The electrophorus was invented by Volta in 1775, and the condenser by the same electrician in 1782. In 1786, Galvani made the discovery which led to the addition of the new branch to the science which bears his name, and which now far exceeds the older branch in extent and practical value. See GALVANISM. In 1787, Coulomb, by means of his torsion-balance, investigated the laws of electric attraction and repulsion. In 1837, Faraday published the first of his researches on induction. Armstrong, in 1840, designed his hydro-electric machine.

Fundamental Facts.—Non-conductors are capable of electrical excitation from friction, and are, in consequence, termed electrics, and conductors not so affected are called non-electrics. The *fundamental principles* of electricity are illustrated by the *electric pendulum*. A glass tube bent at right angles, so as to project horizontally, is placed on a convenient stand. On the hook in which its upper end terminates, a cocoon thread is hung, to the end of which a pith-ball is attached. The ball is thus doubly insulated by the glass and the silk thread. If a tube of glass be rubbed by a dry silk handkerchief, and brought near the ball, the ball is at first briskly attracted, and then as briskly repelled; and if the tube be then moved towards it, it moves off, keeping at the same distance from it. The ball being so affected, or charged, as it is called, a rod of shellac or of sealing-wax, after being rubbed with flannel, attracts it, if possible, more briskly than before, and again sends it off exactly as the glass had done. If the glass tube be now again taken up and rubbed a second time, if necessary, the ball will act towards it as it did towards the sealing-wax. The same series of attractions and repulsions would have taken place if we had begun with the sealing-wax instead of the glass tube. We interpret this experiment in the following way: When glass is rubbed with silk, and the silk removed, it is charged with what is called positive electricity. The ball is attracted by it, and becomes on contact also charged with positive electricity, and is then repelled. When sealing-wax is rubbed with flannel, and the flannel removed, it becomes charged with negative electricity, which is the counterpart of positive electricity, for it attracts the positively charged ball, and communicating its own electricity to it, finally repels it. From such an experiment as this, we conclude that *bodies electrified either positively or negatively, attract neutral bodies and bodies affected with electricity of an opposite name to their own, but repel those affected with electricity of the same name; and that electricity can be communicated from one body to another by contact*. For positive and negative (written also + and -), the terms vitreous and resinous are also employed, as glass and resin are the typical substances from which they may be obtained. Contact is not the only way in which electricity is communicated. We find, when we deal with larger bodies than the pith-ball of the experiment, and sometimes even with it, that the passage of a *spark* between two bodies without contact communicates the electricity of the one to the other. The part played by the rubbers in the above experiment must not be overlooked. The silk handkerchief employed to rub the glass assumes the resinous or - electrical state, and the flannel rubber of the sealing-wax the vitreous or +. This cannot, however, be clearly shown, as the experiment is performed, for the rubbers are in each case tightly embraced by the hand, which neutralizes their peculiar electricity. We can perform our fundamental experiment in a way clearly to show this. Let us take for our rubbing and rubbed surfaces two india-rubber balloons inflated with air (such as children play with), and hold them tightly one in each hand. They may be in all respects perfectly alike. Let us then rub them briskly on each other, and then hold the rubbed sides closely together. On bringing the two in contact near the pith-ball, it remains indifferent to them; but if we pull them apart, and put one on each side of the pith-ball, the ball plays actively between them, being attracted and repelled by each in turn. The fact of no attraction occurring when the balloons are together, shows that in the rubbing both electricities are generated in equal quantities, for they neutralize each other when brought near; and the fact that the balloons must be separated proves that all electric phenomena take place in an electric field, with positive electricity at its one termination, and negative electricity at its other. The non-conducting nature of the india-rubber prevents the electricities finally neutralizing in contact, and disappearing by the hands when apart. It is also instructive that as force is exerted and work is done in pulling them apart, we have the equivalent of that work in the form of an electric field capable of doing work. The motion of the pith-ball, and the heating caused by the tiny sparks which charge it, are evidences of the truth of the statement. It is again worthy of note that both balloons

appear exactly alike, and yet they assume opposite electricities. That there must be some difference may be drawn from the next paragraph.

In most cases of friction, the nature of the rubbing and rubbed surfaces determines the kind of electricity which each assumes. Thus, if glass be rubbed by a cat's fur instead of silk, its electricity is — instead of +. In the following list, each body, when rubbed by any one preceding it, is negatively electrified; by any one succeeding it, positively; cat's fur, smooth glass, linen, feathers, wood, paper, silk, shellac, ground glass. When two pieces of the same material are rubbed together, the colder or smoother becomes positively excited. Metal filings rubbing against a plate of the same metal determine — electricity in themselves and + electricity in the plate. When a white silk ribbon is rubbed by a black one of the same texture, the white one becomes +. A plate of glass becomes + when a stream of air is directed against it from a pair of bellows. The friction caused by steam of high tension issuing from a narrow pipe develops electricities in the steam and pipe which depend on the material of the latter. This fact has been turned to advantage by Armstrong in the construction of a boiler electrical machine of immense power.

Induction.—Free electricity has the power of inducing the bodies in its neighborhood to assume a peculiar electrical condition; this is exhibited in the following simple way: A brass cylinder, rounded at both ends, is insulated on a glass pillar. Two pith-balls, hung by cotton threads, are attached at either extremity. When a glass tube is briskly rubbed, and placed within a few inches of the end of the cylinder, the balls at each end diverge, showing that each pair is charged with similar electricities. When the glass tube is withdrawn, the balls hang down as before, so that the electrical excitement of the cylinder is merely temporary and dependent on the proximity of the excited tube. If, while the balls are apart, a *proof plane*, consisting of a small disk of gilt paper insulated at the end of a glass rod, be made to touch the end next the tube, and then transferred to an electrometer, the electricity is found to be —; if the same be done at the other end, it is +. The nearer end of the cylinder is thus induced by the + electricity of the glass to assume the negative electric state; and as no — electricity can be excited without as much + electricity, we find the other end positively electrified to the same extent. It appears, besides, from the positions taken up by them, that *both electricities observe the same attractions and repulsions as the bodies affected by them*. This action of the electricity of the tube inducing in the cylinder this peculiar electrical condition, is called induction; and the cylinder in this state is said to be *polarized*—that is, to have its poles or ends like a magnet, each having its similar, but relatively opposite force. If the hand touch the cylinder, the balls next the tube diverge further than before, and the other two cease to be affected. In this case, electrically speaking, the cylinder is a portion of the ground, for the hand and body are conductors; the ground is thus brought nearer, more — electricity appears, and the + electricity is lost in the spark with the hand. The — electricity is kept fixed in the part of the cylinder opposite the tube by the + electricity of the latter; and when the hand is first removed, and then the tube, it causes the balls at both ends to diverge permanently. We thus see that electricity can be produced and insulated in conductors by the action of free electricity on them. The + electricity of the further half of the cylinder is as free and insulated as if no — electricity existed within it. This is shown by placing a cylinder near the first, forming a continuation of it, as it were, without touching, when the second cylinder, under the induction of the + electricity of the first, is thrown into the same state as the first. This second can induce the same state in a third, and so on. As the excited tube is withdrawn, the whole series return to their natural condition without being in any way permanently affected. The moment, however, it is again brought near, there is manifested at the further termination of the last a + electricity which exerts the same influence there as if a portion of the electricity of the tube had been actually communicated or transferred to it.

The air intervening between the tube and the cylinder is termed the *dielectric*, for it is through it that the electric action is propagated. In proof of this, we have only to place a cake of shellac between the tube and cylinder, when the polarity of the cylinder will rise higher than before, as would be shown by the further divergence of the balls; and if this or a similar experiment be conducted with sufficient care, we find that the inductive action varies in amount for each non-conductor. Induction, therefore, we have reason to conclude, is not the direct action of one body on another, but an action transmitted through, or possibly residing in the medium between them. In further proof of this, Faraday, who was the first to examine the function of the dielectric in induction, has shown that the action takes place through air in curved as well as in straight lines, which implies the action of an intervening medium. The relative powers of different substances in facilitating induction, are termed by this philosopher *their specific inductive capacities*. The following table by sir W. S. Harris gives the specific inductive capacities of the more important non-conducting substances, taking that of air as unity: Air, 1.00; resin, 1.77; pitch, 1.80; beeswax, 1.86; glass, 1.90; sulphur, 1.93; shellac, 1.95; india-rubber, 2.8. All gases, whether simple or compound, have the same inductive capacity, and this is not affected by temperature or density. If a large plate of metal be placed between the glass tube and the cylinder, the polarization of the cylinder instantly vanishes, for the induction is diverted by it into the ground.

Theory of Induction.—Faraday, taking for granted that the dielectric is the essential

medium of induction, suggests that the molecules of air and other dielectrics are conducting, but that they are insulated from each other. We have already seen that by induction, part of the electricity of an insulated body can be in effect transferred to a surface at some distance from it, without any loss experienced by the exciting body. If, now, we could imagine a series of insulated cylinders diverging in all directions from the glass tube, we have reason to expect that the whole of the electricity of the tube would be in effect transferred to their outer extremities without loss of electricity to the tube. To prove that such would be the case, Faraday took a pewter ice-pail, $10\frac{1}{2}$ in. high, and 7 in. in diameter, and insulated it, placing the outside of it in conducting connection with the knob of a gold-leaf electroscope. An insulated ball, charged with + electricity, was then introduced into it without touching. The pail was thus subjected to polarization, the - electricity being on the inner, and the + electricity on the outer surface. The divergence of the leaves increased as the ball was lowered, until it sunk 3 in. below the opening, when they remained steadily at the same points. The ball was lowered till it touched the bottom and communicated its charge to the pail, when the leaves remained in the same state as before, showing that the + electricity developed by induction on the outer surface was exactly the same in amount as that of the ball itself. He then altered the experiment so as to have four insulated pails inside each other, and the effect on the outmost pail was in no way altered. Here the action of the air between the pails was in effect the same as that of the pails themselves, and if the molecules of air were insulated-conductors like these, they would have acted in no way different from what they did. The action of the molecules of air, in certain circumstances, appears to favor the idea that they are individually conducting. The discharge of electricity by spark through the air, shows that they can be forced to act as conductors; and the currents which proceed from points highly charged with electricity, appear to indicate that they can be attracted and repelled like the pith-balls of our first experiment.

Conductors, according to this theory, are bodies whose molecules have the power of communicating their electricities to each other with great ease, whilst non-conductors are those whose molecules only acquire this power under great force. Wheatstone has shown, as we shall afterwards see, that facility of discharge is not perfect even in the best conductors, as time is needed for its propagation, and it has been found that the terminal laminae of non-conductors between two charged plates become penetrated with opposite electricities, which indicates the slow progress of conduction. The molecules of conductors and non-conductors, therefore, have the same power of mutual discharge, but in very different degrees, so that a good non-conductor may be regarded as an excessively slow conductor.

Potential, Density, Tension, Capacity.—Some idea of the meaning of the word *potential* may be got from the following comparison. Suppose we have a supply of water with a certain head, to fill an elastic bag: when the water is admitted, the bag will swell till the elasticity of the bag is equal to the head of water, and then the flow will cease. The potential is the head of water or elasticity of the bag, so many feet high, or so many pounds per square inch. The capacity of the bag is usually the amount it holds, but capacity in an elastic bag is a shifting quantity, and we must use the term in this way if we wish to compare the capacity of two elastic bags—viz., the ratio of the water it holds to the head that filled it. Thus, a bag holding 10 galls., with a head 1 ft., would have a 10 times greater capacity than a bag holding 10 galls. with a head 10 ft.; for if the first were pressed by a head of 10 ft., it would hold 100 galls., the resistance of the bag being supposed to increase with its contents. Now, let us take a somewhat similar electric problem. An insulated ball is connected with a magazine of energy, ready to make electricity flow when occasion offers, such as a galvanic battery. Let the + pole of a gigantic battery be connected with the ball, and the other pole with the ground, electricity will flow to the ball till the air between the ball and the ground presents an electric reaction equal to the potential of the battery. The charge of the ball taken with reference to this potential gives the capacity of the ball. So much, then, for a popular view of these two words. The potential of a body, or any point in the field, is defined thus—viz., *the amount of work that would be expended in bringing a small quantity, a unit of + electricity, from an infinite distance to the body or point.* If the body is positive, the work would be expended; if negative, the work would be done on the body and the potential -. The said unit of + electricity will always move from a point where the potential is high to one where it is lower; in other words, electricity will always flow between two points where there is a difference of potential, and will cease to flow when that difference ceases. If E be charge, V the potential, C the capacity, then $C = E \div V$. From the definition of potential just given, what we have called the potential of the battery in the preceding illustration is in reality its *electro-motive force*, or the difference of potentials of its poles. As these are alike in power, but different in sign, and as the difference of two quantities of unlike sign is their sum, the electro-motive force is twice the potential of one pole. If the charging line be withdrawn, the ball will be in all respects as if charged by an electric machine. The battery having, so long as it acts, an unlimited supply of electricity, its electro-motive force remains the same; but when balls charge one another, the potential falls just as when a limited supply of water has its head reduced when made to run into another vessel. Potential, then, must be estimated by the resistance of the field, or the work value of the unit of charge. The charge being the same, the potential

risks with the smallness of the body, or the thickness of the dielectric. Density is the quantity of electricity on a unit of surface, and *tension* is the strain which Faraday supposes to exist in the molecules of a dielectric when charged. Tension is commonly used in Gt. Britain and abroad for potential, though our best writers never use it now in this sense.

Distribution of Electricity.—We might take it almost as a self-evident truth, that the greater the surface over which electricity is diffused, the less is its electric potential at any particular point, and so we are taught by experiment. When two equal balls are insulated, and a charge is given to one of them, and then communicated to the other by contact with the first, it is found that both equally divide the charge, but that the potential of the electricity of each is one half of that of the originally charged ball. When a watch guard-chain is charged and laid on the plate of an electroscope by means of a glass rod, the gold leaves diverge most when the chain lies in a heap on the plate; and as it is lifted up, the leaves approach each other, showing that as the exposed surface of the chain increases, the electric potential of each part diminishes. The reason of this is obvious. Let us begin with one ball with a certain charge, then take another equal ball and impart half the charge to it by making the two touch. A spark will be seen at the charge of the second ball. The quantity in both is still the same, but energy has been lost by the spark, and the heat generated by the spark is the measure of the loss. If we continue to add ball after ball until we have a very large surface, the quantity is the same as at first, but energy has been squandered in the sparks of each additional ball, and so the potential is lowered.

Experiment teaches us, that electricity is exhibited only on the surfaces of conductors. A brass ball is suspended by a silk thread and covered with two hemispheres, which can be held by insulating handles, and which exactly fit it. A charge is then communicated to the ball so compounded. When the hemispheres are withdrawn, they are found to take away all the electricity with them, not the slightest charge being left in the ball. The same fact is exhibited by a hollow ball placed on a glass pillar, with a hole in the top large enough to admit a proof plane to the inside. When charged, not the faintest evidence of electricity is found on the inner surface, however thin the material of the ball may be. The thinnest metal plate, when under induction, shows opposite electricities on its two faces. We learn from these and numerous other experiments, that *electricity is only found on the outer surfaces of conductors in an envelope of inappreciable thickness*. This fact is quite in keeping with Faraday's theory of the action of dielectrics. Within a conducting body we cannot expect electricity, for the moment it appears in it, the particles communicate their electricities to each other, and the electric state ceases. In a dielectric they cannot communicate, and the charge remains. Hence the charge at the conductor only appears at the junction of a conductor and dielectric.

We are also taught by experiment that the distribution of electricity on the surface of insulated conductors is influenced materially by their form. An electrified ball, for example, exhibits the same density all round, for the resistance is sensibly the same on all sides of it. When, however, a conducting body is made to approach near enough to it, the density of the electricity is found to be greater on the side on which the approach is made. This is proved by the aid of a proof plane and an electrometer. When work is done in drawing away the proof planes from the charged body, its potential, as tested by the electrometer, is proportional to the density of the charge at the point where it touched. The reason of this unequal distribution is obvious, from the fact that the potential of the ball must be the same at every point. If, therefore, the resistance at one side be less than at another, the density there must be greater to maintain equality of potential. The disturbance of equal distribution here spoken of holds true only for short distances; the disturbing body, for instance, in the case under consideration, has to be brought very near before any inequality in the distribution of electricity on the ball becomes manifest. It is to this concentration of electricity on the side of the approaching conductor that we owe the electric spark; and it is as we near the striking or sparking distance that this disturbance is revealed. The concentration or fixing of electricity on the side of the thinnest and best dielectric, is particularly illustrated in the condenser (q.v.) and Leyden jar, whose action depends upon it; but in these the dielectric must be very thin to secure decided effect. When a conductor somewhat in the form of a prolate spheroid is charged, and the electric density of the several parts tested by the proof plane, it is found to be least at the thickest part, and to increase towards either end; and the difference is found to be all the greater as each end becomes more and more pointed. It is found likewise that the electric density on a point is so great with a considerable charge as to destroy the dielectric condition of the air, the particles of which become electrified and carry by convection the charge of the point to surrounding conductors. We therefore learn that *electricity concentrates on points and projections*. A similar reasoning with regard to the relations of potential resistance and consequent density bears here as in the previous case. It may be here remarked that the density of charge at any point regulates the amount of tension at that point on the molecules of the dielectric. The constraint which they experience in being charged, and which Faraday calls tension, can only be carried to a certain limit. When that is reached, the molecules are forced to be conducting, and the tension ceases.

Static electricity for experimental purposes is now obtained from machines which ap-

ply friction to suitable substances, such as glass, rubber, etc. In a tube of glass and silk rubber we have the embryo of the electric machine, viz., a body which, when rubbed, is positively electrified, and its rubber negatively. The first requisite we should expect in a machine of this nature is a large surface, to give a great amount of electricity. But there is another already casually referred to; glass being a non-conductor, the electricity formed on its surface has not a combined action, so that some arrangement is necessary to collect it, and render it available—to act, in fact, as its conducting reservoir. This portion of the machine is denominated the *prime conductor*. The rubbed surface of the electric machines is either a cylinder or plate of glass; hence we distinguish them into cylinder machines and plate machines. The former, from their more compact form, are the more manageable; and the latter, from both sides of the glass plate being rubbed, are the more powerful forms of the instrument. The description of Winter's plate machine (fig. 1) will be quite sufficient to show the general requirements and construction of electric machines. It is one of the best existing forms of the machine. The glass plate is turned on the axis *ab* by means of the handle *c*. The longer end of this axis, consisting of a glass rod, moves in the wooden pillar *d*, and the other rests in the wooden head of the glass pillar *e*. The plate is thus completely insulated, and little loss of electricity takes place through its supports. The two rubbers are triangular pieces of wood, covered with a padding of one or two layers of flannel enclosed in leather, and they present a flat, hard surface to the glass, so that friction between it and them takes place in every part. They are placed in a wooden frame on each side of the plate, and the pressure is regulated by metal springs fixed to the outside between them and the frame. Before use they are covered with an amalgam of mercury, zinc, and tin, which is made to adhere with the aid of a little grease, and which increases immensely the production of electricity. The surfaces of the rubbers are therefore conducting, and are made to communicate by strips of tin-foil with the *negative conductor*, *f* (fig. 1). To limit the electric field in the neighborhood of the negative conductor, or, which is the same thing, to keep the potential of the glass from rising too high, so as to cause a discharge back into the rubbers, each rubber has a non-conducting wing fastened to it, which is made of several sheets of oiled silk, kept together by shellac varnish, beginning at the rubber with several, and ending with one or two sheets. When the machine is in action, electrical attraction makes them adhere to the plate; but when it is out of action, they may be kept up by a split pin *g*. As the plate turns, the rubbers are kept in the frame by their ledges *h*. The whole framework of the rubbers and negative conductor is supported by the short glass pillar *i*, so that it can be insulated when required. The prime conductor, *k*, is a brass ball insulated on the long glass pillar, *l*, and to prevent the edges of the ball at the junction dissipating the electricity, the pillar enters the ball by a trumpet-shaped opening. The collection of the electricity from the glass is made by a row of points placed in the grooves, inside of two wooden rings, *m, m*, which are attached on each side of the plate to a piece of brass projecting horizontally from the ball of the conductor. The grooves are covered with tin-foil, which conveys the collected electricity to the ball, and the points are kept out of the way of injury by not projecting beyond the grooves.

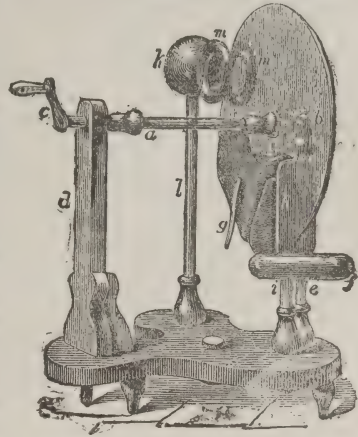


FIG. 1. Electric Machine.

Electrometers and Electroscopes.—These words are generally taken as synonymous; electroscopes, however, should be applied to the instruments which give evidence of electrical potential without giving the exact measure of it; and electrometers to such as show both. Of late years, immense progress has been made in the construction of delicate electrometers, chiefly to meet the demands for such in the working or testing of submarine cables. Sir William Thomson's quadrant electrometer and his absolute electrometer, in point of exactness and delicacy, are a hundredfold in advance of previous instruments. We shall here, meanwhile, describe the common forms of electric indicators. The *quadrant electrometer* consists of a conducting-rod, generally of box-wood or brass, with a graduated semicircle attached above, in the center of which is a pivot for the rotation of a straw carrying a pith-ball at its outer end. It is used for a charge of high potential, such as that of the electric machine. When placed on the prime conductor of the machine, the whole becomes charged with + electricity; the ball is repelled first by the electricity of the rod, then by that of the prime conductor, the height to which it rises being seen on the semicircle. This is not an electrometer in the strict sense of the word, for although it tells us, by the straw rising and falling, when one potential is greater or less than another, it does not tell us by how much, the conditions of its repulsion being too complicated for simple mathematical expression. It can show us, however, by the indicator standing at the same point, when the electric potential of the machine is the same at one time as another.

Leyden Jar. —This is a glass jar, with a coating of tin-foil pasted carefully inside and out, extending to within a few inches of the mouth. This last is generally closed by a wooden stopper, through which passes the stalk of a brass knob or ball surmounting the whole. The connection between the inside coating and the ball is completed by a chain extending from the stalk to the bottom of the jar. If this jar be put on an insulating stool, so that sparks can pass from the prime conductor of a machine to the knob, when the jar is thus insulated, one or two sparks pass, and then the charge seems complete, for no more sparks will follow, though the action of the machine is continued; or, if they do, they are immediately dissipated from the knob in a brush discharge. If, then, however, the knuckle of the experimenter be brought near the outer coating, sparks begin again to pass freely; and for every spark of $+$ electricity that passes between the machine and the knob, a corresponding spark of the same name passes between the knuckle and outer coating. This continues for some time, and then the jar appears to be again saturated. It is now said to be fully charged. The outside of the jar can, in this state, be handled freely, and if it be still on the insulating stool, so may also the knob, although, when the hand first approaches, it receives a slight spark. But if, when the experimenter has one hand on the outer coating, he bring the other hand to the knob, before it can reach it, a straight, highly brilliant spark passes between the knob and his hand, and he experiences a shock of great violence. If he try the same thing again, a feeble spark and shock again ensue, and the jar is now thoroughly discharged. As it is highly inconvenient, if not dangerous, to discharge the jar through the body, *discharging tongs* are used for that purpose, which consist of two brass arms ending in balls, and moved on a hinge by glass handles.

The velocity of electrical discharge is found to be about 192,000 m. per second.

ELECTRICITY, STORAGE OF. A storage of energy which is able to directly produce an electric current. The term is a misnomer, as electricity itself cannot be stored. A so-called storage battery or accumulator when acted upon by a current undergoes a certain chemical change. The chemicals which are thus separated recombine again when the circuit of the battery is closed, and in uniting give off a current of electricity about equal to that by which they were decomposed. Lead is the metal most commonly used in accumulators, the positive plate having a coating of lead peroxide, PbO_2 , and the negative plate a surface of spongy lead.

The idea of electrical storage may be traced back to 1801, at which time Gautherot showed that platinum wires used in the electrolysis of saline solutions developed secondary currents. Later, Ritter constructed a secondary pile of copper discs separated by cloths moistened with a solution of sal ammoniac. By charging this a few moments with a powerful galvanic battery, the pile gave a strong shock. Volta, Becquerel and others discovered that other metals, as gold, silver, and platinum, gave secondary electric currents when subjected to electrolytic action in certain solutions. In 1842, Grove produced his celebrated gas battery, which gave a current by means of the difference in polarity of oxygen and hydrogen, the constituents of water. With a battery of 50 gas cells Grove produced arc lights, electrolysis, and many well-known effects. In Faraday's "Researches" he mentions the high conductivity of peroxide of lead and its power of giving up its oxygen. He also discovered, in electrolysing a solution of acetate of lead, that peroxide of lead was produced at the positive, and spongy metallic lead at the negative pole. Gaston Planté was the first to apply this principle to a secondary cell, which was afterwards developed and modified by Faure and others.

A great deal of attention has been given to the nature of the chemical reactions in the lead-sulphuric acid cell, and it cannot be said that these chemical changes are well understood yet. In a general way, however, they are sufficiently well known to enable manufacturers to produce cells of any desired capacity and rate of discharge. Storage batteries may be divided into two general classes: Those in which the active material (peroxide of lead) is formed on the surface of the plates by chemical or electro-chemical action, and those in which some easily reducible salt of lead is applied mechanically. The former are known as the Planté type, and the latter as the "pasted" or Faure type.

The Planté cell is the simplest form of storage battery. The earliest cells were formed of two lead plates immersed in a dilute solution of sulphuric acid in water. The solution should have a specific gravity of 1.17 before charging, and as the charge proceeds the specific gravity increases to 1.195 at full charge. At each successive charge the peroxide formed on the positive plate sinks deeper into the metal, and this action continues until the metal is covered to a sufficient thickness to protect the lead from electrolytic action. There is no difficulty in forming the positive plate in a Planté cell, but with the negative plate the action is very slow. The latter is the great difficulty with all Planté cells. The usual method of forming the spongy lead is to charge the cell, allow it to rest, then reverse the charge through the cell. At each reversal of current the peroxide is liberated at the surface, leaving metallic lead in a very finely divided state. The voltage of a lead-sulphuric acid cell is about 2 volts. The above description is applicable in a general way to all cells of the Planté type, of which there are a great many varieties. Most of the modifications introduced by different manufacturers are mechanical changes with a view to exposing more surface of lead to the action of the electrolyte. Many of these plates are corrugated, built up of very thin sheets slightly separated, grooved, etc., and are too numerous to describe in detail. The Planté accumulator is a very efficient

cell when once formed, but the great amount of time it requires for forming is its chief drawback.

Pasted cells of the Faure type are now the most important and generally used cells. To avoid the great loss of time used in forming the Planté cells, Faure devised the method of pasting a layer of chemically prepared oxide of lead to the surface of the plates. This was done by spreading the plates with minimum, or litharge, made into a thick paste by the addition of acidulated water. After drying, these plates were placed in a bath of dilute sulphuric acid, and then subjected to an electric current. A piece of felt was placed between the plates to prevent the lead salts from disintegrating. After charging, the salt on positive plate is reduced to peroxide of lead, while that on the negative plate is converted into porous lead. The chief fault of the early Faure cells was the disintegration of the active material, which would drop away from the plate. Many methods have been devised for holding the active material on the plates, the most common of which is to cast a grid, or plate with cells or perforations, into which the active material is pressed. All of the modern cells are made with perforated plates of this description. Besides these two types of accumulators, which are the most important ones, there are a number of others, in which the elements are composed of lead-zinc, copper, etc., none of which are in very extensive use.

The use of the storage battery has grown considerably in recent years, and yet it is still very far from being a satisfactory article. Its efficiency varies from 60 to 75 per cent., and its depreciation may be very rapid if it is not operated with great care. Its use in electric light stations to take extra loads and light all-night loads, has been found advantageous, and most of the large central stations have auxiliary storage plants. It is very important not to discharge accumulators faster than the rate for which they are built, as it results in the speedy destruction of the plates. They are not well adapted to traction purposes, as the motion of the car jars out the active material from the plates, and in starting the car a high rate of discharge is required. The weight and bulk of accumulators is also against their use on cars.

ELECTRIC LIGHTING. The first practical application of electricity was as a means of furnishing artificial light, and this has been the most extensively developed of its uses. The first electric light was that made by sir Humphry Davy in 1809, at the Royal institution in London, when on separating the ends of the wires leading from a battery of two thousand cells, which was the largest battery that had ever been constructed, a brilliant light was seen. This was due to the heating of the ends of the wire

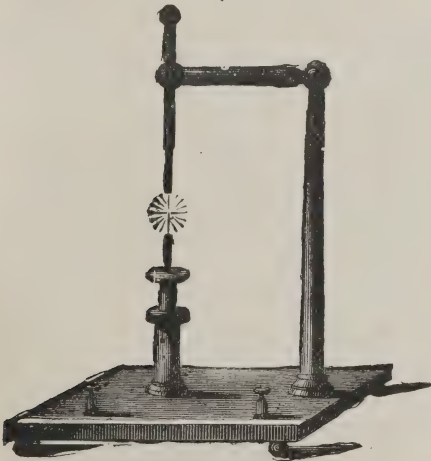


FIG. 1.

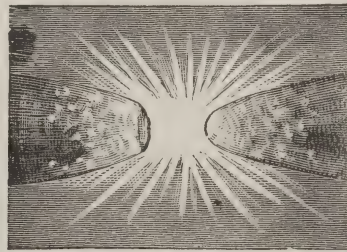


FIG. 2.

by the passing current. A few lamps were made to give light in this way, with a simple apparatus illustrated in fig. 1, but electricity was too expensive to allow lights so produced to be used to any extent until the invention of dynamo generators of electricity, about 1870. Then Jablochkoff introduced his electric candle, which was seen by all the world

in Paris in 1870. And although it did not furnish a means of producing an economical light, it did a great deal to awaken public interest in the new means of illumination. The Jablochkoff candle was immediately followed by a number of other lamps of greater simplicity, and consequently of great commercial value. These improvements in the lamp, together with the improvements in dynamos, have advanced the art of electric lighting to a position of successful competition, with all other methods of artificial illumination. The early forms of arc lamps possessed very bad features of regulation, that is, the method of feeding the carbons so that the arc is maintained constant as the carbon burns away. Lamps are generally made with the lower carbon stationary and the upper one to feed downwards. The feeding is operated either by a train of wheel-work, electrical or mechanical motors, gravity, or the action of a solenoid. When the lamp is not in operation, the upper carbon falls and rests upon the lower one,

but when the current is passed through them they are separated the required distance by means of an electro-magnet whose coils are traversed by the whole current of the lamp. In order to maintain the carbons the proper distance apart, the upper carbon is held by a clutch or other device whose position is controlled by an electro-magnet. The coils of this electro-magnet are a shunt or branch off the main circuit, of high resistance. When the carbons are at their normal distance apart, the current of the shunt circuit is not of sufficient strength to move the clutch from the position in which it prevents the downward motion of the carbon rod, but when the carbon has sufficiently burned away to increase the resistance of the arc to a determined extent, the increased current which is thereby produced through the shunt circuit is then sufficiently strong to release the clutch and permit the carbon to feed downward. In a well regulated lamp this feeding occurs so gradually that it produces no perceptible effect on the steadiness of the light. Arc lamps require a pressure of about 45 volts to maintain the arc across the separated carbons. Formerly arc lamps were always used in series, that is, the current entered the first lamp, passed successively through each following lamp, and from the last lamp returned to the generator. As each lamp requires 45 volts, and often 100 or 125 lamps are used in series, the voltage of the current will be the sum of the voltages of all the lamps in one series. The lamps as made at the present day require a current of from 8 to 10 amperes. The above description applies to lamps for a direct current. Lamps are also made for alternating currents, but are not so efficient as those described, and are comparatively little used. Another style of lamp which has come into extensive use is adapted to burn on an incandescent light circuit. These circuits are about 100 volts in pressure, and the lamps are run two in series. Each series of two lamps is connected between the conductors leading from the positive and negative pole, or in other words, each pair of lamps is connected in multiple. It is apparent that if in a series circuit any one lamp breaks the circuit no current will pass through any of the lamps. To obviate this trouble each lamp is provided with an automatic cut-out. This consists essentially of an electro-magnet in a shunt circuit, arranged so that if the resistance of the lamp gets too high the current around the magnet increases up to a point at which the magnet moves an armature, which closes a by-path for the main current around the lamp, thus cutting it out of the series. Double carbon lamps were introduced to increase the length of time the lamps would burn without renewing the carbons. In these lamps one pair of carbons are consumed before the other pair come into use. Another lamp designed for longer life of the carbons is known as the incandescent arc lamp. The ordinary arc lamp requires trimming every night, and some of them twice a night. The carbons in the incandescent arc light will burn about a week, or from 80 to 100 hours. This is effected by enclosing the arc in a globe or chamber made as nearly air-tight as possible, consistent with allowing the carbon to feed through the top of it. A small valve opening outwards is connected with the chamber. When the lamp is lighted, the intense heat of the arc expands the air in the chamber and forces out a part of it through the valve, which also prevents the admission of outside air to the chamber. The carbons then burn in a rarefied atmosphere, and the leakage of air into the chamber is so slow that the carbons are oxidized but very slowly. This class of lamps has been perfected within two or three years, and its use especially for interior lighting has grown considerably.

Incandescent electric lighting was introduced by Edison in 1880. Previous to that date many attempts to "subdivide the electric light," as the problem was then called, had failed for want of a suitable substance for the filament of the incandescent lamp. Outside of some of the metals which proved failures, carbon is the only substance yet known which is a conductor of electricity and will stand a sufficiently high temperature for use as incandescent lamp filaments. The carbon strip or filament is bent into the shape of a horse shoe or loop and placed inside of a glass bulb called the lamp chamber. The lamp chamber is exhausted by means of a mercury pump (See AIR PUMP) after which it is hermetically sealed. The exhaustion of the bulb should be as perfect as possible, and in order to insure the complete removal of all the air in the bulb, and the occluded gases in the carbon filament, both the bulb and filament are heated to a high temperature during the latter part of the process of exhaustion. Both the exhaustion and the heating of the lamp must be continued up to the moment that it is sealed. The ends of the filament are attached to platinum wires passing through one end of the glass bulb, and are called leading-in wires. These must be of platinum because this metal expands with the heat in nearly the same proportion as glass, and in the case of any other metal the expansion would either crack the glass or allow air to be admitted at the joint. Filaments are prepared from numerous substances, such as silk, hair, wood fibre, cotton, cellulose, &c. These substances require baking at high temperatures in order to reduce them to pure carbon, their other constituents being driven off by the heat. In some processes of making filaments no treatment is required after the baking, as the filament is then turned out perfectly even in cross section throughout its length. Most filaments are not perfectly even in diameter over their whole length, and any unevenness makes either bright or dull spots when lighted. To correct this the filament is burned for a few moments in a hydro-carbon vapor. The spots which burn brightest on the filament are those of smallest diameter, and they have a higher temperature than the rest of the filament. Now carbon is deposited from the hydro-carbon on to the filament when a certain temperature is reached, and the higher the temperature the faster the deposit. The spots of higher temperature will take on the deposit of carbon

faster than the rest of the filament, and in this way the diameter throughout becomes perfectly even in a few moments.

The size lamp generally used gives 16-candle power and from 10 to 15 of these can be lighted per horse-power. Lamps are made of different efficiencies, the most usual consumption of power being from 3 to 4 watts per candle-power. Incandescent lamps are connected in multiple, that is, each lamp is connected across the two conductors leading from the poles of the generator. In special cases large lamps of high candle-power are connected in series on arc light circuits, and miniature lamps of small candle-power are used several in series on incandescent light circuits. The usual voltage of incandescent lamps is about 100 volts, although some 50-volt and a few 200-volt lamps are in use.

ELECTRIC LOOM. See WEAVING.

ELECTRIC MOTORS, machines for converting electricity into mechanical power, in construction and principle identical with dynamos (see MAGNETO-ELECTRIC MACHINES), and differing only in a few minor points. They are fitted with one or two appliances usually, for stopping and starting them and regulating their speed and power. Being in fact dynamos, they have the same efficiency of about 90 per cent.; that is to say, a motor which is supplied with 100-horse power of electricity will furnish about 90-horse power to the machinery it is driving. The special advantages are that they are small, light, clean, easy to manage, and can receive any amount of power through a small wire led into the building at some convenient out-of-the-way place. Owing to these advantages, power can be obtained and used in many places where it would be out of the question without the aid of electricity. Street cars may be propelled by it, the shafting on the different floors of factories may be driven without connecting belts passing through the floors, and power may be obtained in places where the amount needed is so small that the expense of a steam-engine and attendant would be out of proportion and too great. Among the machines frequently requiring power in such places may be mentioned small elevators, ventilating fans, sewing-machines, and all kinds of machinery. Current for driving motors is obtained either from galvanic batteries, in the case of very small machines, or from the dynamo circuits from which electric lights are supplied. A vast number of motors are supplied with current from lighting stations during the daytime when but little demand for lighting exists. There are two general methods of supplying the electric current for operating motors, known respectively as the *multiple arc* system, which is the same as that by which incandescent lights are supplied, and the *series* system, by which arc lights are supplied. See ELECTRIC LIGHTING.

In the multiple arc system the electricity is kept at constant pressure, while the quantity which passes into any machine connected to it depends upon the size of the passage which is offered to the electricity, in the same way that the amount of water which will flow out of a tank depends upon how wide the valve is opened. Motors connected to such circuits regulate themselves by cutting off the current when the speed of the motor has reached the proper limit.

Among motors of this kind are the Edison, Thomson-Houston, C. & C., and others. In the series system a definite amount of current is forced through the wire, and the amount of electric power absorbed is regulated by forcing this definite current to do more or less work as it passes through. Motors operating on such circuits cannot regulate themselves by cutting off the current when sufficient speed is attained. In place of this, a number of devices have been made for the purpose of regulating motors on these circuits. One arrangement for this purpose is that employed in the Crocker-Wheeler motor. It consists of a gramme ring armature revolving in a stationary field magnet and provided with a governor attached to the shaft within the pulley of the machine. When the speed of the motor reaches the proper limit, the governor draws the armature lengthwise out of the field, thereby weakening the power, and keeping the machine running at constant speed under any variation of the work required of the motor. See the *Electric Motor and its Applications*, Martin and Wetzler; *Dynamo-Electric Machines*, S. P. Thompson.

ELECTRIC ORGAN. Electricity is used in two ways in operating organs—for pumping and for operating the valves leading to the various sounding tubes in accordance with the manipulations of the key-board. In many places, especially in large churches having complicated organs, a part of the organ tubes are at such distance from the key-board as to preclude the air being admitted to them and shut off quickly as is required in playing, by any mechanical means which can be actuated by the weak force with which the organist depresses the keys. To meet this difficulty, the agency of electricity has been invoked, and now in all large organs the connection from tubes to key-board is made in this way: The valve admitting the air to the sounding tube is controlled by an electro-magnet. This magnet is connected by a wire to the key-board, and is led to a contact point on the under side of the key corresponding to this tube. The wire is also connected to a suitable battery which supplies the current when this key is depressed, and also supplies the wires leading from all the other keys to the other tubes. When the keys are depressed by the organist the magnets throw open the air valves, and the corresponding notes are sounded without effort of the operator. The application for pumping air for organs is made by the use of an ordinary electric motor (q.v.), the motor being connected to an electric light circuit to draw its supply of electricity and geared to the bellows of the organ, so as to operate the latter.

ELECTRIC RAILWAYS. The most extensive application of the transmission of energy by electricity is its use for operating electric railways. In all such roads the power for propelling the cars is supplied by a steam engine or other prime mover at a central station, and is converted by a dynamo into electric energy, which is carried by suitable conductors parallel to the car tracks. By means of sliding contacts this current is led to an electric motor upon the car, which converts the electric energy back to mechanical energy for propelling the car. The invention of the electric railway is generally credited to Thomas Davenport, a self-taught blacksmith, of Vermont, who constructed several models of electric railways in 1835, some of which are still in existence. Numerous experiments in electric propulsion followed the attempts of Davenport, but no practical commercial system was devised until 1888, just fifty-three years after the original invention. From 1880 to 1888 a number of experimental roads were constructed, but the first successful electric railway in its modern form was opened in Richmond, Va., Feb. 1, 1888. The full-page illustration shows the central station of this road.

On January 1, 1895, the number of electric railways in the United States and Canada was as follows:

| STATE. | No. of Roads. | No. of Miles of Track. | No. of Motor Cars. |
|---------------------------|---------------|------------------------|--------------------|
| Alabama..... | 6 | 66.75 | 79 |
| Arizona..... | 1 | 5.00 | 4 |
| Arkansas..... | 5 | 44.00 | 54 |
| California..... | 21 | 266.25 | 366 |
| Colorado..... | 12 | 206.50 | 244 |
| Connecticut..... | 17 | 144.75 | 368 |
| Delaware..... | 1 | 22.00 | 61 |
| District of Columbia..... | 6 | 52.50 | 72 |
| Florida..... | 2 | 8.00 | 12 |
| Georgia..... | 23 | 230.25 | 293 |
| Idaho..... | 1 | 3.00 | 2 |
| Illinois..... | 25 | 419.25 | 608 |
| Indiana..... | 24 | 348.50 | 545 |
| Iowa..... | 17 | 232.75 | 297 |
| Kansas..... | 9 | 121.00 | 144 |
| Kentucky..... | 6 | 146.50 | 307 |
| Louisiana..... | 4 | 50.50 | 100 |
| Maine..... | 10 | 65.50 | 93 |
| Maryland..... | 10 | 184.25 | 280 |
| Massachusetts..... | 41 | 825.31 | 2,819 |
| Michigan..... | 22 | 249.02 | 410 |
| Minnesota..... | 10 | 299.40 | 684 |
| Missouri..... | 23 | 350.15 | 847 |
| Montana..... | 5 | 53.80 | 37 |
| Nebraska..... | 7 | 141.00 | 168 |
| New Hampshire..... | 2 | 26.50 | 28 |
| New Jersey..... | 25 | 299.18 | 648 |
| New York..... | 50 | 770.80 | 1,886 |
| North Carolina..... | 7 | 37.25 | 55 |
| Ohio..... | 47 | 611.75 | 988 |
| Oregon..... | 6 | 110.00 | 153 |
| Pennsylvania..... | 108 | 1,043.00 | 2,095 |
| Rhode Island..... | 8 | 141.00 | 391 |
| South Carolina..... | 1 | 21.00 | 6 |
| South Dakota..... | 1 | 7.25 | 3 |
| Tennessee..... | 10 | 179.50 | 226 |
| Texas..... | 22 | 267.50 | 307 |
| Utah..... | 4 | 88.00 | 102 |
| Vermont..... | 1 | 8.00 | 6 |
| Virginia..... | 9 | 63.00 | 62 |
| Washington..... | 20 | 195.00 | 164 |
| West Virginia..... | 3 | 29.00 | 52 |
| Wisconsin..... | 12 | 235.25 | 301 |
| Canada..... | 23 | 354.86 | 570 |
| Total..... | 677 | 10,013.77 | 16,927 |

The total number of surface railways in the United States driven by animal power, electricity, and cables is about 950.

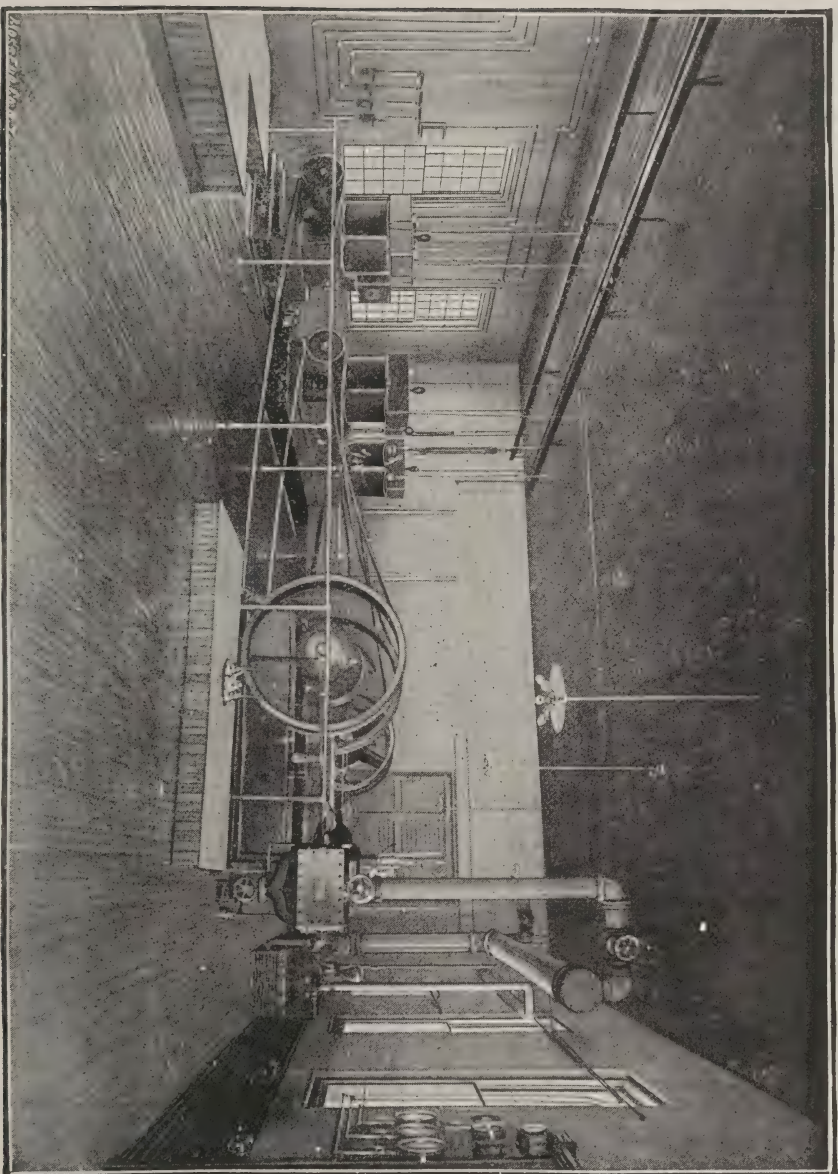
The three principal parts of an electric railway are: (1) the central station; (2) the line and track construction; and (3) the car equipment.

Central Station.—The power plant which operates an electric railway is preferably situated as near as possible to the centre of the system of car lines to which it supplies power, and contains a power plant, by means of which the dynamos are driven. The dynamos for railway work, as well as the engines, are very substantially built, owing to the heavy and constant changes in the load, caused by the stopping and starting of cars. In starting the motor car of the average size used on street railways on a level road about twelve to fifteen horse-power is required at the station, which amount, however, may be considerably increased by a bad condition of the track. In starting up steep grades three or four times as much power may be needed, but this excessive load is only momentary, and the power expended falls rapidly to half or less of that used in

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Central Station for supplying Electricity.

starting as the car gains momentum. This condition of sudden and wide fluctuations in the load imposes the need of very sensitive and quick-acting engine governors, as the dynamo speed must be kept constant.

Line and Track Construction.—The single overhead trolley system has, with a very few exceptions, been generally adopted in the U. S. and Canada. In this system the current is led from one pole of the dynamo to a single wire suspended over the centre of the track, and reaches the car motors through the trolley-wheel and arm, whose upward pressure keeps it constantly in contact with the overhead wire. From the motor the circuit is completed to the other pole of the dynamo through the car-wheels and the track, which acts in the same capacity as the overhead conductor. Trolley lines are constructed with either hard drawn copper or silicon bronze wire of from a quarter to half an inch in diameter, and are supplemented by parallel feeder wires, with which they are connected at regular intervals. By dividing the overhead lines into two or more parallel strands it permits the trolley wire to be divided into sections or blocks, any of which can be disconnected from the system and repaired in case of accident without affecting any other sections of the road. The trolley wire is insulated by the hangers which support it, the bodies of which are composed of various insulating materials, such as moulded mica, porcelain, etc. The tracks, which are used as conductors, are connected so as to form a continuous metallic circuit from the car-wheels to the dynamos at the station, and as the rail-joints cannot be relied upon to make a good electrical connection, on account of the non-conducting rust which forms on the surfaces in contact, it is necessary to either bond or weld the tracks. Bonding is the general practice, and consists of riveting a wire at the ends of two rails, so as to form a by-path around the joint. The two parallel tracks are also cross-connected by bonds at intervals of the length of a rail. The tracks thus connected are supplemented by ground wires corresponding to the feeders for the trolley wire. Since the introduction of electric welding several attempts have been made to weld the ends of the rails together, making a single unjointed rail of the entire length of the road. This method has been only partially successful, as there is a tendency to breaking at the welds, due to the expansion and contraction of the track at different seasons. The best results with welding have been obtained with deep rails, in which the greater surface is under ground.

Several other methods have been employed for distributing the current to the cars, but none of them have attained much prominence. The double overhead trolley system, in which the second wire corresponds to the track circuit, described above, is still in use on a very few roads, but is undesirable on account of the crossing of wires of opposite polarities at switches, track-crossings, etc., and the liability of short circuits from falling telephone and telegraph wires. A number of conduit systems have also been devised, all of which may be divided into two classes—open or slotted conduits and closed conduits. In all conduit systems the chief obstacles lie in the expense of construction and the difficulty of securing proper drainage. Either one trolley wire and a track return or two trolley wires may be used with the open conduits. A successful example of the latter construction is the street-car system of over twenty-five miles in Budapest, which has been in operation for several years. Closed conduit systems are those in which, by electromagnetic switches or other automatic devices, the current is supplied only to the section of the conductor directly beneath the car. One arrangement of this kind, which will illustrate the object in view, was to place a bare conductor in a rubber tube, similar to a hose pipe, upon the upper side of which was placed a line of contact points, fixed like rivets through the tube. As the trolley traveled along the tube, which was flattened by its weight, these contacts were pressed down upon the inclosed bare conductor, and the current was thus led to the motors. The tube springing back to its normal shape only delivered current at the point where it was pressed down by the trolley. A great deal of attention is being given to the subject of closed conduits.

Car Equipment.—One or more electric motors geared to the car axles and a controlling switch on each platform constitute the principal parts of a motor-car equipment. Instead of having the journal boxes attached to the car frame, as in horse cars, the motors and running gear are attached to a car truck, on which the car body rests. The remarkable improvement which has been made in the design of street-car motors within the last four or five years is the principal cause of the success of electric railways. The first car motors were entirely too light mechanically and of too small capacity. From a single fifteen horse-power motor driving one car axle, the capacity of the car equipments has been gradually increased up to the present practice of using two twenty horse-power motors, one geared to either axle. A marked improvement has also been made in the reduction of armature speeds, so that the use of a double reduction in speed by means of a countershaft and two pairs of gears between the armature shaft and the car axle is almost obsolete. Gearless motors, in which the armature is built on the car axle, have been introduced by one manufacturer, but single-reduction motors having the armature shaft geared directly to the car axle are most commonly used at present. Almost all modern car motors are of the multi-polar type instead of the bi-polar, as formerly, and the reduction in armature speeds is due to this change of design. The severe service to which street-car motors are subject has led to making them very substantial in design, in order to avoid mechanical injury, and so-called ironclad (can refer to illustration under *magneto-electric machines* of Westinghouse Ironclad Car Motor)

motors, in which the field magnets form a closed iron box, are largely used to prevent short-circuiting by water or by nails or scraps of iron picked up by the magnets. Most of the single-reduction, four-pole motors are supported on one side on the car axles by journals set in projecting lugs at each end of the motor frame, the armature shafts being parallel to the car axles. The opposite sides of the motors are connected to the frame of the car truck by means of springs, and a pinion on each armature shaft meshes with a gear wheel on either axle. The function of the springs is to avoid a shock on starting the car, by permitting the motors to turn through a small arc about the axles. In gearless motors the armature shaft is a hollow tube, through which the car axle passes, and to which it is flexibly connected by means of springs. Another method in use with some geared motors is to place the motor on the truck with its shaft at right angles to the car axles. The shaft carries a bevel pinion at each end which mesh with bevel gears on both of the car axles. With this system a single motor of large capacity is used. A number of attempts have been made from time to time to connect the armature shaft and the axle by belts, sprocket chains, friction clutches, etc., none of which has been able to stand the service.

The starting and regulation of speed of the car is effected by means of the controlling switches on the car platforms. The methods of regulation of the different electric railway systems are too numerous to be described in detail, but the same general plan is common to them all. Series machines are always used in railway work, and the field windings are wound in a number of separate sections, the ends of which are carried to contact pieces in the controlling switches. In addition to the resistance of the field winding a resistance box is also used. The contact pieces in the controller press against corresponding rows of metal plates, each row having its plates connected so as to vary the connections of the wires from the motor. In starting the car, the resistance box, sections of the field coils and armature are all in series to prevent a too large passage of current through the armature. The next turn of the switch cuts out more or less of the resistance box circuit, allowing more current to pass, and by successive movements of the switch the field coils pass through various combinations, from all in series to all in multiple, the latter corresponding to the highest car speed. To stop the car, the switch is reversed, making the same combinations in reverse order. To change the direction of the car, a separate switch is generally provided, which changes the direction of the current through the armature with reference to its direction through the fields. In systems where there is no commutation of the field coils, the changes in speed depend entirely upon the variable amounts of extra resistance thrown into the circuit. The cars used on electric railways vary from 16 feet to 35 feet long, and weigh 6 to 11 tons.

ELECTRO-CHEMICAL ORDER OF THE ELEMENTS. When two metals are placed in contact and immersed in a solution capable of acting on one of them, an electric current is produced, positive electricity passing from the metal acted on, through the liquid, to the metal unacted on. The former metal is said to be *electro-positive* to the latter. By experimenting with different pairs, we can arrange the metals in electro-chemical order. This order depends upon the readiness with which the metals are acted upon by the solution, and is not the same for all solutions.

The following is the electro-chemical order of the more common metals, the liquid being dilute sulphuric or hydrochloric acid: Sodium, magnesium, zinc, iron, copper, silver, platinum. When a compound of two elements is electrolyzed, the electro-positive element appears at the negative electrode, and the electro-negative element at the positive electrode. It is impossible to make a single table of the electro-chemical order of the elements, as this is not the same under all circumstances, but it may be generally stated that oxygen is the most electro-negative element, and that next to it are the elements chlorine, bromine, fluorine, sulphur, etc., which form stable compounds with the metals.

ELECTRO-CHEMISTRY, OR ELECTROLYTICS. The name electrolysis (breaking up by electricity) is given to the process of transmission of the electric current through liquids, when accompanied by the disruption of the molecules composing the circuit; the constituent radicals of the molecules being set free at the two poles.

The plates in the decomposition cells are called electrodes (electric ways); the plate connected to the + pole of the battery, usually copper, platinum, or carbon, is the anode (way up, as carrying the current out of the battery); the plate connected to the — pole of the battery (the zinc) is the cathode (downward way).

The liquid undergoing decomposition is the electrolyte. The molecules of an electrolyte break up into two radicals, which are called ions (indicating individuality, and in another sense meaning "going"). Those ions which turn towards the anode are called anions. They are electro-negative or acid radicals, such as oxygen and chlorine. Those which turn towards the cathode are called cations. They are electro-positives or basic radicals, as hydrogen and metals. The same ion may belong at different times to each of these classes if united to one having a higher individuality in either direction, for there is no direct attraction between the electrodes and the ions themselves, but the relation depends simply upon the temporary polarity they assume in the circuit.

Ions or radicals may be single atoms or compounds, which act as radicals chemically, and these may even be incapable of actual separate existence as far as present knowledge goes. Hydrochloric acid is an electrolyte composed of two single atoms. In sulphuric

acid two atoms of hydrogen form one ion, and the compound radical, SO_4 , the other. This radical cannot exist uncombined, so that sulphuric acid is an electrolyte only when in presence of something it can react on and combine with, such as water, although water itself is not an electrolyte. Ammonium, NH_4 , is also a compound ion strongly resembling potassium in its properties; it also cannot exist free, but breaks up into NH_3 (ammonia) and hydrogen, giving an apparent exception to the law of equivalence, by producing two free substances, each equivalent to the current producing them; but it must be considered that ammonia is not really a radical, for NH_3 may be considered as the equivalent of a complete molecule and is not capable of replacing hydrogen in salts.

We must regard the circuit as consisting of chains of molecules, some metallic, as in the plates and conductors; some liquid, as in the cells; and the transmission of electricity, as consisting of a motion of each molecule in the chain, accompanied with the breaking in halves of a molecule wherever the current passes from metal to liquid, or vice versa. We shall thus understand why there is equal current, equal quantity of electricity, or equivalent chemical action at every section of the circuit. Because there are the same number (or value, as will be seen presently) of molecular actions effected at every part, however the molecules themselves may differ in nature. Each cell is, therefore, a section of the conductor, and each has its own specific resistance, just as the wire portion has. But the cells are of two orders in one respect.

(1) Generating cells, in which energy is set free by chemical actions, and becomes electro-motive force, setting up the current. These are battery cells, represented by E in electrical formulæ. (2) Decomposition cells, in which energy is absorbed in doing chemical work. These may be simple resistances, where no ultimate change is made in the solution; such are most electro-plating and electro-metallurgical processes where the same metal is dissolved from the anode as is set free at the cathode. But if any ions are actually set free by the current, they tend to recombine and act as a cell of the first order, with their electro-motive force opposed to that of the battery. This "counter E M F" is represented in formulas by $-e$, as is the electro-motive force of secondary batteries. See ELECTRICITY, STORAGE OF. The feeblest electro-motive force will send a current through the first of these classes of decomposition cells, but the second class require an E M F greater than that of opposition set up by the action itself, or electrolysis cannot take place, for the reason that no current will be produced if stopped by this counter E M F, as it is called. Except for this distinction of generating and decomposing, all the cells are under the same conditions. In each cell there is a $+$ plate or element, the zinc in the battery cells and the anode in the decomposition cells, and if the latter can unite to the chlorous radical of the electrolyte, it dissolves, just as the zinc does in the battery cells. In each cell there is the electrolyte which gives up its chlorous or $-$ ion, at the $+$ plate, and transmits the molecular motion, which constitutes the current to the $-$ plate where it also gives up its $+$ ion. The $-$ plate then continues as the $+$ pole or anode to the next cell, and ultimately to the $-$ pole or terminal zinc of the battery to complete the circuit. In fact, each pair of connecting plates in separate cells acts as though it were a metallic partition separating the two liquids with which the plates are in contact. In such a plate or conducting partition, one side would be $+$ and the other side $-$, and the two plates in different cells correspond to these two sides, united by a connecting wire instead of by the mass of metal of the plate itself. It is of the utmost importance to bear in mind this distinction of plates or elements related to the liquid within their own cell, and of poles or electrodes related to another cell, and to the direction of the polarity they set up, or the current they transmit. Leaving out of sight the distinction of cells, as those setting up and those absorbing energy, that plate in each cell which is $+$ to its own liquid, or the positive plate of the cell, is the anode or $+$ electrode of the cell to which it is connected, and completes the circuit from the $-$ plate of this cell. Hence it is that the anode in the decomposition cell represents the zinc in the battery cell, for, like the zinc, it is $+$ to the liquid, and gives up energy to the liquid (though that energy is derived from the current itself in this cell), and, like the zinc, it dissolves if made of materials which can combine with the negative or $-$ radical of the solution. For this reason some prefer to call the anode the zincode. The laws of electrolysis usually accepted are those of Faraday, who also originated the terms described. These laws are:

1. *No elementary substance can be an electrolyte. That is to say, the two ions must be differently composed.*

2. *Electrolysis occurs only while the body is in the liquid state.* This state may be due to either fusion or solution; in the latter case many substances which are not electrolytes of themselves may become electrolytes by a secondary action.

3. *During electrolysis the components of the electrolyte are resolved into two groups; one group takes a definite direction towards one of the electrodes, the other group takes a course towards the other electrode.* They turn towards the several electrodes in polar order, but are not attracted or moved towards them by a direct attraction of the polar electrodes. Faraday held that only substances containing single equivalents of each radical could act as electrolytes, but this is now superseded by more general conceptions.

4. *The amount as well as the direction of electrolysis is definite, and is dependent upon the degree of action in the battery being directly proportional to the quantity of electricity in*

circulation. This law shows that quantity of electricity means number of equivalent molecular actions.

5. *Those bodies only are electrolytes which are composed of a conductor and a non-conductor.* This addition of Miller's is useful to remember, but can scarcely take rank as a law or principle of nature.

It is of importance to learn what is the quantity of matter which constitutes the equivalent, as it is often considered to be what used to be called the chemical equivalent. If this were true, and if Faraday's theory were also true, that only molecules consisting of one equivalent of each radical are electrolytes, the old equivalent theory of chemistry would be almost impregnable; but neither of these ideas is true. The equivalent or lowest combining proportion of nitrogen is 14, that of hydrogen being 1; but when pure ammonia is electrolyzed, only $4\frac{1}{2}$ of nitrogen is given off for one of hydrogen. When cupric chloride, CuCl_2 , and cupreous chloride, Cu_2Cl_2 , are electrolyzed in series, the first gives one equivalent, and the second two equivalents of copper for the same current which in the battery or other cell gives one of hydrogen.

For practical applications in this field, see ELECTRO-METALLURGY, ELECTRO-CHEMISTRY, ELECTRO-PLATING. See also Sprague's *Electricity*.

ELECTROCUTION. See ELECTRICITY, DEATH CURRENT OF.

ELECTROLYSIS. See ELECTRO-CHEMISTRY.

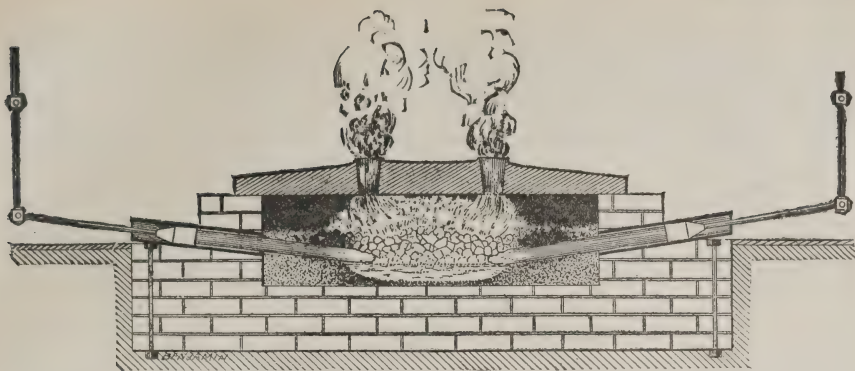
ELECTRO-MAGNET. See ELECTRICITY.

ELECTRO-METALLURGY AND ELECTRIC SMELTING. Electro-metallurgy is the art of treating metals by the use of electricity. The birth of electro-metallurgy as a distinct branch of science may be said to have occurred in 1807, in which year Sir Humphrey Davy succeeded in producing metallic sodium and potassium by electrolysis of the fused hydrates in the laboratory of the Royal Institution, London. This new branch of study was followed up by Faraday in the same laboratory during the period from 1812 to 1840, and the results of his experimental work placed the science upon a firm basis of accurately observed phenomena, and led to the formation of laws and theories which are still accepted after fifty years of further progress. In 1851 Charles Watt obtained an English patent for electrolytic processes by which caustic alkalis and chlorine, chlorates and pure metals could be produced on an industrial scale, but it was not until 1890 that electro-metallurgy attained a commercial development. The chief cause of this delay was undoubtedly the lack of a cheap source of electrical energy. Until the latter year copper refining was the one electrolytic industry, but since that date there has been a remarkable expansion in other directions, and there are now at least 18 distinct branches, while in Europe alone there are about 100 establishments in which these manufactures are carried on. In recent years, since currents of great power have been made available by the invention of powerful dynamos, electro-metallurgical processes have been successfully carried on on a very much bolder scale than formerly, when they were confined to electro-plating. Electrolytic actions, which are the foundation of metallurgy, can be carried on when substances are in the liquid form. This form may be obtained by raising the temperature of the substances until they are in a state of fusion, as well as by putting them in solution, as in the processes described in the article on ELECTRO-PLATING (q.v.). This process of electrical decomposition of substances, when fused, has lately received many applications. In one of these it has been applied, in a very ingenious electrical furnace, illustrated herewith, to the work of separating a few very refractory substances from their ores.

By the passage of the decomposing currents between the electrodes in this furnace sufficient heat is developed to melt the minerals, thereby bringing them into the liquid condition, when the same current, by its decomposing action, separates the substance sought for, from the others, with which it is in chemical combination. The particular furnace shown, which has been in practical use at Lockport, N. Y., for some years, was especially designed for extracting from their natural earths, aluminium and other minerals which are difficult to obtain. See ALUMINIUM.

By means of this furnace several substances which contain valuable metals, but which were very hard to decompose, are easily torn apart and the metals obtained. By this furnace the production of large quantities of the aluminium bronzes, at prices low enough to compete with brass, has been accomplished and is now being carried on, while formerly, before the use of electricity for the purpose, the prices of these alloys were so high as to put them out of the question.

Electro-metallurgical and electro-chemical processes have made remarkable progress in the last ten years, and in 1897 there were in Europe and the United States 142 plants in operation, in which various products were made electrolytically. These may all be regarded as permanent industries, whose natural growth is assured by the purity and cheapness of the materials so manufactured. Besides these industries already established, new processes in this field are constantly being discovered. Among the more important processes are those for producing aluminium, copper, zinc, gold, silver and nickel, besides which there are a large number of materials such as sodium, potassium, white lead, calcium carbide, carborundum, etc., to which electrolytic processes are specially adapted.



Copper refining has become a very important industry, and the electrical process is an ideal one for extracting small amounts of impurities from commercial copper. There are 35 establishments for producing electrolytic copper, of which 16 are in the United States. The production of gold and silver by electrolytic methods is an assured industry, as in no other way can they be so easily and cheaply refined. In all gold mining districts where the cyanide extraction process is used the electrolytic method will be found extending. There are two such plants in Germany, 5 in the United States and 8 in the Transvaal. The manufacture of white lead will probably become an important one because the evils arising from lead poisoning in operating the older process have only been tolerated because no other satisfactory and economical method was formerly known.

The cheapening of the cost of electrical energy has been alluded to as the principal incentive to the extension of electro-metallurgical operations. The recent use of water-powers in this connection is very noticeable. In Europe there are in actual operation 16 companies which are utilizing water-powers for the manufacture of metallurgical products, and at the present time (1897) there are eight water-powers in course of development for similar processes.

In the United States the development of the water-power at Niagara Falls has led to the establishment of a number of metallurgical operations in that neighborhood. Large plants are established there for the manufacture of aluminium and carborundum, and a new plant has just been completed for the manufacture of sodium peroxide, which is used in the manufacture of hydrogen peroxide solution. The latter is extensively used for bleaching, and the peroxide of sodium is said to contain 12 times as much oxygen available for bleaching as the ordinary hydrogen peroxide solution.

The possibilities of electro-metallurgy seem almost infinite, and the field in this direction for new and valuable applications of electricity seems very promising, more especially as electrolysis seems to afford a means of accomplishing some chemical actions which are otherwise impossible.

ELECTROPHONE, an instrument devised by Dr. Strethill Wright for producing sound by electric currents of high tension. In its simplest form, the electrophone consists of two metallic plates separated by a sheet of cartridge-paper, the whole being closely pressed together by a heavy weight or screw. Such an instrument, when its plates are connected with the terminals of a small induction-coil, forms a sonorous condenser, the note of which varies with the rapidity of action in the electrotome or contact-breaker.

The more complicated electrophone communicated to the royal Scottish society of arts, 25th April, 1864, by Dr. Wright, is composed of four curved plates of the thinnest sheet zinc, each 2 by 4 ft., and each separated from its neighbor by a double layer of imitation silvered paper, the silvered sides being in apposition to the zinc. The first and third and second and fourth plates are connected by fine wires, which also connect the instrument with the induction-coil. When this instrument is connected with a small coil, the terminals of which afford a spark almost inaudible, it becomes charged and discharged with each impulse of current, each charge being attended by a sonorous tap given out by the whole mass of metal thrown into vibration, and the rapid succession of taps producing a prolonged trumpet-note, the power of which may be increased by adding battery-power to the coil. The electrophone has been recommended by its author for use as a telegraphic relay capable of giving two or four signs with a single wire, with the advantage over other relays that perfection of contact was not necessary to its working. Fig. 1 shows the mode of working the electrophone as a double relay with four signals and the galvanometer of Thomson; A represents the needle of the galvanometer, B and C the wires communicating with an electrophone. When the needle is deflected to the right, it falls on the points B and C, and sounds the electrophone through B, A, C. The signals are produced by long and short contacts, as in the code of Morse. The



FIG. 1.

The signals are produced by long and short contacts, as in the code of Morse. The

second set of signals is produced by the reversal of the line-current, which throws the needle on the points of the arrangement D connected with a second electrophone of different tone. The electrophone has been employed as a lecture-table instrument to report to a large audience results of processes which can only be rendered sensible by the most delicate galvanometric apparatus. Fig. 2 shows the adaptation of the electrophone to the galvanometer. AB represents the needle of the galvanometer suspended by a silk

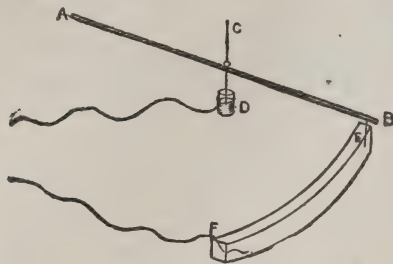


FIG. 2.

fiber, C; D is a small vessel of mercury communicating by a fine wire with the center of the needle; while a similar wire, attached to the end of the needle B, dips into the curved trough EF, containing distilled water. The wires inserted into D and F connect the coil with the electrophone, the current passing through F, E, B, D. When the needle is deflected, the tract of water between E and F is shortened, and the electrophone gives forth a gradually increasing sound. By a delicate system of levers attached to the wrist, as in the sphygmograph (q.v.), the rhythm and character of the human pulse, and its variation in disease, may be indicated to the class by the physician. Further, the electro-

phone may be adapted to the telephone by making the telephone membrane act the part of a make-and-break for the current circulating in the primary wire of induction-coil. This can easily be done by leading the current through the membrane, and through a spring carrying a platinum point, which presses lightly against a piece of platinum attached to the center of the membrane. If the sounds uttered into the telephone be sufficiently strong to make the membrane so to vibrate as to cause actual separation between the platinum surfaces, they will be reproduced with great loudness in the electrophone; but if, as in the case of speaking, they be merely able to cause variations of pressure at the surfaces, they will be but imperfectly heard. Hence the electrophone succeeds best with singing (see TELEPHONE), and a song gently sung in one place may be repeated in trumpet-tones in another hundreds of yards distant.

ELECTROPHORUS. This generally consists of a tin mold filled with shellac, and a movable metal cover, with a glass handle. The shellac is poured in when melted, and it is mixed with some other substance, to make it less brittle. Five parts of shellac, one of wax, and one of Venice turpentine, is given as a good mixture. When used, the surface of the cake of shellac is smartly beaten with a cat's fur or foxtail. The cover is then put on, and touched with the finger, which receives a slight spark of - electricity, just before contact takes place; and after the finger is removed, the cover, when lifted by its insulating handle, gives a brisk spark of + electricity to anything presented to it. This can be repeated for several minutes without any apparent exhaustion of the source of electricity; and in dry weather, sparks can be got in this way hours, and frequently days after the cake has been beaten.

The action of the electricity may be thus accounted for. When the surface of the cake of shellac is beaten, the friction excites - electricity on it. This acts inductively all round, but the tin mold being the nearest conductor, and shellac a good dielectric, the induction becomes concentrated on it, + electricity becoming fixed on the side next the shellac, and - electricity being sent to the ground. The - electricity of the upper surface of the shellac is thus fixed by the + electricity of the mold. When the cover is put on the cake, the contact between the two is not sufficient to allow the latter to communicate its charge to the former. The cover is thus acted on inductively, not conductively. The - electricity of the cake, then, has the choice of two channels for its induction, either through the cake to the mold, or through a very thin film of air to the cover. The latter, from its offering so short a passage through the dielectric, has the preference, and the inductive action of the charge is diverted from the mold to the cover, and the + electricity on the other side of the cake is thus liberated and lost in the ground. The cover being strongly polarized, + electricity is induced and fixed on its lower surface, and - electricity on its upper, this last being transmitted to the ground by the finger. When the finger is withdrawn, and then the cover, the + electricity of the latter is free to discharge itself by spark, and inductive action again takes the direction of the mold, once more attracting + electricity to it. The induced polarity of the cover is attended with no loss to the charge of the shellac, which can thus continue to act with the same efficiency. The loss of electricity that all charged bodies experience in air, and especially when moist, at length discharges the cake, but this takes place all the less readily, that when the electricity is not needed to act on the cover, it is kept bound by the + electricity induced by it in the mold. In order that the + electricity of the mold should have liberty, so to speak, to come and go, the electricity must not be insulated; and when it is so, the action on the cover is feeble, if at all perceptible.

ELECTRO-PLATING. The decomposition of salts by the battery has received a most important application in electro-plating, or galvano-plastics, by which is meant

the art of precipitating certain metals from their solutions by the slow action of a galvanic current, by which means the salts of certain metals are decomposed, the metal being deposited on the negative pole, while the acid is liberated at the positive. The art was discovered independently by Spencer in England, and by Jacobi in Petersburg.

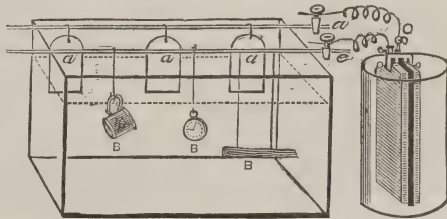
In order to obtain a galvano-plastic reproduction of a medal or any other object, a mold must first be made in which the layer of metal is deposited by the electric current.

For this purpose several substances are in use, and one or the other is preferred, according to circumstances. For medals and similar objects which can be submitted to pressure, gutta-percha may be used with advantage. The gutta-percha is softened in hot water, pressed against the object to be copied, and allowed to cool, when it can be detached without difficulty. For the reproduction of engraved wood blocks or type, wax molds are now commonly used. They are prepared by pouring into a narrow flat pan a suitable mixture of wax, tallow, and Venice turpentine, which is allowed to set, and is then carefully brushed over with very finely powdered graphite. While this composition is still somewhat soft, the wood block or type is pressed upon it either by a screw press or, still better, by hydraulic pressure. If plaster of Paris molds are to be made use of, it is essential that they be first thoroughly saturated with wax or tallow, so as to become impervious to water.

In all cases, whether the molds be of gutta-percha, of wax, or any non-conducting substance, it is of the highest importance that the surface be brushed over very carefully with graphite, and so made a good conductor. The conducting surface thus prepared must also be in metallic contact with a wire or a strip of copper by which it is connected with the negative electrode. Sometimes the molds are made of a fusible alloy, which may consist of 5 parts of lead, 8 of bismuth, and 3 of tin. Some of the melted alloy is poured into a shallow box, and just as it begins to solidify, the medal is placed horizontally on it in a fixed position. When the alloy has become cool, a slight shock is sufficient to detach the medal. A copper wire is then bound round the edge of the mold, by which it can be connected with the negative electrode of the battery, and then the edge and the back are covered with a thin non-conducting layer of wax, so that the deposit is only formed on the mold itself.

The most suitable arrangement for producing an electro-deposit of copper consists of a trough of glass, slate, or of wood, lined with india-rubber or coated with marine glue.

The figure shows one of glass. This contains an acid solution of copper sulphate, and across it are stretched copper rods, *a* and *e*, connected respectively with the negative and positive poles of a battery. By their copper conductors, the molds *B B B* are suspended in the liquid from the negative rod, while sheets of copper, *a a a*, presenting a surface about equal to that of the molds to be covered, are suspended from the positive rod at the distance of about 2 in., directly opposite to them.



The battery employed for the electric deposition of metals ought to be one of great constancy, and Daniell's and Smee's are mostly in use. The currents of electricity furnished by magneto-electrical machines of a special construction are also used in large establishments.

The copper plate suspended from the positive pole serves a double purpose: it not only closes the circuit, but it keeps the solution in a state of concentration, for the acid liberated at the positive pole dissolves the copper and reproduces a quantity of copper sulphate equal to that decomposed by the current.

Another and very simple process for producing the electric deposit of copper consists in making use of what is in effect a Daniell's cell. A porous pot or a glass cylinder covered at the bottom with bladder or with vegetable parchment is immersed in a vessel of larger capacity containing a concentrated solution of copper sulphate. The porous vessel contains acidulated water, and in it is suspended a piece of amalgamated zinc, of suitable form and having a surface about equal to that of the mold. The latter is attached to an insulated wire connected with the zinc, and is immersed in the solution of copper sulphate in such a position that it is directly opposite to the diaphragm. The action commences by the mold becoming covered with copper, commencing at the point of contact with the conductor, and gradually increasing in thickness in proportion to the action of the Daniell's element thus formed. It is, of course, essential in the process, to keep the solution of copper sulphate at a uniform strength, which is done by suspending in it muslin bags filled with crystals of this salt.

The extreme delicacy which such electric deposits can attain appears from the fact that galvano-plastic copies of the greatest accuracy can be made of daguerreotypes.

A novel process of electro-plating animals, flowers, tissues, and other natural objects, has been brought out in France. Slugs or snails are washed in water to clean them and then placed in distilled water until they give off their albuminous matter. This liquid is filtered and boiled for an hour; then distilled water is added to make up for that lost by boiling, and in addition about 3 per cent. of nitrate of silver. The solution is kept

in a dark place, in hermetically sealed bottles until required for use, when about 30 grammes of the liquid are mixed with about 100 grammes of distilled water. The objects to be electro-plated are then immersed for a few moments in the liquid, are next placed in a bath consisting of about 20 per cent. of nitrate of silver dissolved in distilled water, and are finally submitted to the action of sulphuretted hydrogen gas by which the nitrate of silver on the albumen-coated object is reduced. The organic object is thus fitted to receive the electro-deposited metal, and the layer obtained is of superior fineness and delicacy.

ELECTRO-POSITIVE ORDER OF THE ELEMENTS. As a voltaic current is produced whenever two metals are placed in metallic contact in a liquid which acts more powerfully upon one than upon the other, there is a great choice in the mode of producing such currents. In reference to their electrical deportment, the metals have been arranged in what is called an electro-motive series, in which the most electro-positive are at one end, and the most electro-negative at the other. Hence when any two of these are placed in contact in dilute acid, the current in the connecting wire proceeds from the one lower in the list to the one higher. The principal metals are as follows :

| | | |
|------------|-------------|--------------|
| 1 Zinc. | 6 Nickel. | 11 Gold. |
| 2 Cadmium. | 7 Bismuth. | 12 Platinum. |
| 3 Tin. | 8 Antimony. | 13 Graphite. |
| 4 Lead. | 9 Copper. | |
| 5 Iron | 10 Silver. | |

It will be seen that the electrical deportment of any metal depends on the metal with which it is associated. Iron, for example, in dilute sulphuric acid is electro-negative towards zinc, but is electro-positive towards copper ; copper, in turn, is electro-negative towards iron and zinc, but is electro-positive towards silver, platinum, or graphite.

The relative positions in this scale of the substances depend, somewhat upon the nature of the liquid in which they are placed.

ELECTROSCOPE is any instrument for the detection of the presence of electricity. It depends for its action on the principle that bodies charged with like electricity repel, while those charged with unlike electricity attract each other. The ordinary pith-ball is the simplest form of the instrument. The most perfect form is Bennet's gold leaf electroscope, but Cavallo's, Volta's condensing, and Bohnenberger's electroscopes are also used.

ELECTROTYPE, PHOTOGRAPHIC. Much thought and labor have been expended in producing a relief-plate to take the place of wood-engraving, and various methods of etching on metal by the aid of photography have been brought to light. The earlier of these never were successful, because after the acid has eaten or etched below the surface protected by the asphaltum, there is nothing to prevent it from undermining the lines, as the acid will eat in one direction as well as another, thus weakening them to such an extent that they often break down in printing. With the gelatine process, the gelatine must be of a thickness compatible with the depth desired. A gelatine of this thickness will become nearly, if not quite insoluble before it is dry, through the action of bichromate alone. Also the color of the gelatine, after the bichromate has been added, is such as to prevent the action of light from penetrating to the proper depth in the time during which it can be exposed. These are the almost insurmountable reasons why a relief-plate in gelatine has not been obtained till the advent of a new process called photo-electrotype. W. H. Mumler, of Boston, Mass., has now succeeded in overcoming these obstacles. After printing upon his gelatine, through a negative, the necessary time to secure all the details, the parts unaffected are dissolved away to a slight depth. The interstices are then filled with a black paste, when it is again exposed to light ; the soluble parts that were protected by the opacity of the negative in the first printing are now protected from the action of light by the black paste that covers them. The second exposure may be continued for a length of time sufficient to allow the light to penetrate its entire depth ; and the action of light being to render the gelatine insoluble, it can readily be seen that the protected parts can be dissolved away to the depth to which the light has penetrated. The gelatine relief is then placed in a drying closet for a few hours, when it becomes as hard as horn. From this an electrotype is taken in precisely the same manner as from a wood-cut. It is then mounted on mahogany blocks, type high, when it is ready for the press. The result is an electrotype plate with a surface as smooth as polished plate-glass, and a depth far exceeding that of ordinary wood-cuts. See PHOTOGRAPHY.

ELECTROTYPING. The process of forming exact reproductions of type, wood-cuts, and so forth by means of the process of electro-plating (q.v.). See also **ELECTRO-METALLURGY** ; **ELECTRO-CHEMISTRY**. Electrotypes are very much used in printing on account of their furnishing inexpensive and perfectly accurate reproduction of the original. By their use many complete sets of type for printing are quickly obtained, and the original type is saved from the great wear which would result from the direct printing from them of many thousands of copies.

ELECTRUM is a term used to designate native gold as it is associated with silver. It is also applied to amber.

ELECTUARY (Lat. *eligere, electum*, I make choice), a form of medicinal preparation in which the remedy is enveloped or suspended in honey or syrup, so as to make a mixture of thick semi-fluid consistence.

ELEGIT, ESTATE BY, the right in lands which is enjoyed by one who has acquired the land under writ of elegit (q.v.)

ELEGIT, WRIT OF, a writ whereby a creditor in England can seize the lands of his debtor in satisfaction of his claim. By 1 and 2 Vict., c. 110, the whole of the lands, including copyhold and customary lands, are made subject to the debt. A creditor who has seized the lands is not entitled to take the person of his debtor; for, as imprisonment for debt is practically abolished, except where fraud was used, this and *fieri facias* (q.v.) are the only remedy of creditors.

ELEGY (Gr. *elegeia*), according to its derivation, signifies, exclusively, a song of lamentation, but the term was employed at an early period by the Greeks to designate any poem written in distiches. The alternation, peculiar to this measure, of the hexameter, or strictly narrative verse, with the more fiery pentameter, gives to this whole species of poetry its individual character, which consists in the connection of subjective feelings and emotions with external incidents or objects. The E., therefore, can often be chiefly, but never altogether narrative. The effect of the measure is further shown in the circumstance, that earnest, long-sustained feelings, rarely violent passions, are expressed in the elegy. Of the numerous elegies of the Greeks, few have come down to us. Those still extant consist partly of encouragements to patriotism, as in Callinus and Tyrtaeus, and partly of lessons of practical wisdom, as in Solon and Theognis. Sometimes also it expressed yearning desire or mild sorrow, or amorous complaints. This was especially the case at Alexandria. Among the Romans, Catullus was the first good elegiac writer; after him came Propertius, Tibullus, and Ovid. Tibullus, in particular, brought the erotic E. to its highest perfection. All are marked by the absence of political or moral feeling. They lived at a time when it was dangerous to express the one, and unfashionable to express the other—viz., the Augustan age. In modern times, the term E. is applied in England to any serious piece where a tone of melancholy pervades the sentiments, whether grief is actually expressed or not; as, for example, Gray's "*Elegy*, written in a country church-yard."

ELEGY, in music, is a composition depicting feelings of mourning, sadness, longing or ardent desire, and love.

ELEMENTAL SPIRITS, beings who, according to the popular belief of the middle ages, presided over the four "elements," living in and ruling them. The E. S. of fire were called salamanders; those of water, undines; those of the air, sylphs; and those of the earth, gnomes. These imaginary beings play a part in Pope's mock-heroic poem, *The Rape of the Lock*.

ELEMENTS, in astronomy, are those numerical quantities, and those principles deduced from astronomical observations and calculations, which are employed in the construction of tables exhibiting the planetary motions. They include the greatest, least, and mean distances of the planets from the sun, the eccentricities of their orbits, their mean motions, daily and annual, with the motions of their aphelia, and the inclinations of their orbits to the ecliptic; their masses and densities, etc. The E. of the different planets and of their satellites will be found under their names. The reader will find tables of the E. of all bodies in our system in most books on astronomy. See in particular Herschel's *Elements of Astronomy*.

ELEMENTS, CHEMICAL. The word elements has a very different signification in modern science from what it once had. The earliest of the Greek philosophers assumed either a single element, or several, the modifications and combinations of which they held to give rise to all the things that we see. The most common assumption was that of four elements—fire, air, water, and earth. This corresponds to the four forms under which modern science considers matter as existing—viz., imponderable, gaseous, liquid, and solid; while by elements are understood the simple component ingredients of bodies under whatever form they exist. Neither air, water, nor earth are elements in this sense, for they can be decomposed into simpler ingredients, and fire is a combination of light and heat. It is not pretended that any of the substances called elements are absolutely simple, that is, contain only one kind of matter; but only that hitherto they have not been decomposed. The number of so-called simple bodies, or elements, recognized by chemists is 65, of which some have been known from ancient times, such as the metals gold, silver, lead, copper, tin, and mercury; others are of more recent date; whilst quite lately two new metallic elements have been added to the list—viz., cæsium and rubidium, both of which were discovered by prof. Bunsen of Heidelberg, by the aid of the new branch of practical chemistry named *spectrum analysis*. The elements are divided into two great classes—the *non-metals* and *metals*. The latter are the more numerous class, there being altogether 50, whilst the non-metals number only 15. The following table gives the names of the elements at present known:

TABLE OF THE ELEMENTARY SUBSTANCES.

| <i>Non-metallic.</i> | | | |
|------------------------|-------------------|--------------------|----------------------|
| Hydrogen. | Oxygen. | Nitrogen. | Carbon. |
| Chlorine. | Sulphur. | Phosphorus. | Boron. |
| Bromine. | <i>Selenium.</i> | Arsenic. | Silicon. |
| Iodine. | <i>Tellurium.</i> | | |
| Fluorine. | | | |
| <i>Metallic.</i> | | | |
| Potassium. | Copper. | Nickel. | <i>Tantalum (Co-</i> |
| Sodium. | Silver. | Cobalt. | <i>lumbium).</i> |
| <i>Lithium.</i> | Mercury. | Chromium. | <i>Niobium.</i> |
| <i>Cæsium.</i> | <i>Yttrium.</i> | <i>Molybdenum.</i> | Gold. |
| <i>Rubidium.</i> | <i>Cerium.</i> | <i>Tungsten.</i> | Platinum. |
| Calcium. | <i>Lanthanum.</i> | <i>Uranium.</i> | <i>Iridium.</i> |
| Barium. | <i>Didymium.</i> | Tin. | <i>Osmium.</i> |
| Strontium. | <i>Erbium.</i> | <i>Titanium.</i> | <i>Ruthenium.</i> |
| <i>Beryllium (Glu-</i> | <i>Terbium.</i> | <i>Zirconium.</i> | <i>Rhodium.</i> |
| <i>cinium).</i> | Aluminum. | <i>Thorium.</i> | <i>Palladium.</i> |
| Magnesium. | <i>Indium.</i> | <i>Vanadium.</i> | |
| Zinc. | <i>Gallium.</i> | Antimony. | |
| <i>Cadmium.</i> | Manganese. | Bismuth. | |
| Lead. | Iron. | | |
| <i>Thallium.</i> | | | |

The more rare elements are printed in *italics*. Although the classification adopted above is a convenient one for the study of the elements, yet there is no decided line of demarkation between the metallic and non-metallic (otherwise called metalloïd) series. The metals are generally recognized (1) by their power of reflecting light, as exhibited in the luster of burnished gold, and even in ordinary mirrors, which owe their power of reflecting light to the amalgam of the metals mercury and tin, present on the glass; (2) by their power of conducting heat; and (3) by their ready transmission of electricity. The non-metals or metalloïds are regarded as not possessing all these three attributes. The non-metals carbon and silicon, however, in certain forms conduct electricity, whilst the metals arsenic and tellurium resemble the metalloïds in many of their properties, and are classed with them. In the combinations of the various elements with each other, the non-metals constitute the electro-negative ingredient, and, as a rule, are insulators in the galvanic current; whilst the metals form the electro-positive element of the combination, and are conductors of the electric fluid. Again, in their combination with oxygen, the non-metals form more or less powerful acids, whilst the metals produce more or less powerful bases. At ordinary temperatures, five of the E. are gaseous—viz., oxygen, hydrogen, nitrogen, chlorine, and fluorine; two are liquid—viz., bromine and mercury; whilst the remaining 58 are solid.

Steady progress in chemical science presents the names of several substances which claim admission to the list of elements, with varying degrees of confidence. All are constituents of rare minerals, and none of them are likely to acquire much importance in practical affairs. The small quantities yet found have made the discussion of their oxygen compounds very difficult, and leave their appropriate atomic weights liable to different determinations.

The following list gives their status as known in Aug., 1884:

| Name. | Symbol. | At. w't. | Discoverer and Remarks. |
|-----------------|---------|------------|---|
| Thulium..... | ..... | 171 | Cleve, 1880. |
| Gallium..... | Ga. | { 69.9 } | Lecoq de Boisbaudran, 1875. White, sp. gr. 5.93, melts at 30.16°. |
| Decipium..... | Dp. | Doubtful. | M. Delafontaine. 106=DpO, 159=Dp ² O ³ . |
| Phillipium..... | Pp. | " | M. Delafontaine in 1880 gave 123 or 125. |
| Ytterbium..... | Yt. | 173.1 | M. Marignac. |
| Scandium..... | Sc. | 43.97 | L. F. Nilson, 1880, in a Scandinavian mineral. |
| Norwegium..... | Ng. | { Doubt- } | Teleff Dahll, in copper-nickel, color white, melts at 254°. |
| | | { ful. } | Sp. gr. 9.441. 145.95=RO, 218.93=R ² O ³ . |

F. W. Clarke (*Chemical News*, 1884), gives the following as imperfectly determined: Titanium, Tellurium; badly determined, Palladium, Rhodium, Ruthenium; very badly determined, Silicon; doubtful, Yttrium, Zirconium; very doubtful, Osmium. Prof. Robinson (Cambridge, Eng.) thinks Bührig's atomic weight for Cerium too high. Samarium needs confirmation. Phillipium may be Holmium. See L. Meyer and K. Seubert's *Atomgewichte der Elemente* (Leipzig, 1883). See CHEMICAL NOMENCLATURE; CHEMISTRY.

ELEMENTS, SACRAMENTAL. The materials used in the communion service are usually recognized as bread and wine, but some ancient sects used bread and water, and the Syrian Christians mix oil and salt with the bread. See LORD'S SUPPER.

E'LEMI, a fragrant resinous substance, obtained from different species of the natural order *amyridaceæ*. It was formerly brought chiefly from Egypt or Ethiopia, and was referred to a tree called *amyris elemifera*. Part of the E. of commerce is now brought from America, and is obtained from trees of other genera, but of the same natural order, particularly *icica icicariba*, which grows in Brazil and other warm parts of America. In dry weather, incisions are made in the bark, from which the resinous juice flows abundantly, and hardens in the sun. It is collected once a day, and put into casks. It is at first soft and unctuous, but becomes hard and brittle by age. *Elaphrium elemiferum* is believed to yield the greater part of the E. of Mexico. E. is usually in large, pale-yellow, semi-transparent masses, fragile, softening by the heat of the hand, with a smell somewhat resembling that of fennel. It is soluble in alcohol, except a white crystallizable residue, which is very light, inodorous, and tasteless, and which is called *elemine*. The properties of E., however, chiefly depend on a volatile oil, which may be obtained from it by distillation. E. is used in the preparation of stimulant plasters and ointments.

ELEPHANT, a geographical term of obvious origin, indicates various localities in Asia and Africa.—1. Elephant point, a promontory of Pegu, in Further India, marks the w. extremity of the mouth of the Rangoon, the most easterly arm of the Irrawaddy. It is in lat. 16° 28' n., and long. 96° 25' east.—2. Elephant bay, an inlet of the Atlantic, on the coast of Benguela, s.w. Africa, in lat. 18° 14' s., and long. 12° 33' e., has excellent anchorage, but no fresh water.—3. Elephant island, in Senegambia, is about 100 m. up the Gambia.—4. Elephant river, in the Cape Colony of South Africa, enters the Atlantic after a course of 140 m., about lat. 31½° s., and long. 18° east.

ELEPHANT (Gr. *elephas*), a genus of quadrupeds, of the order *pachydermata* (q. v.), and of the section *proboscidea*. Elephants are the largest existing land animals. The ordinary height at the shoulder is about 8 ft., but sometimes exceeds 10 feet. The weight of a large E. is about five tons, the body being very bulky in proportion to its height. To sustain this weight, it is furnished with limbs of colossal thickness and strength, which are also remarkably straight, each bone resting vertically on that beneath it. From the appearance of inflexibility presented by the limbs, arose the notion prevalent among the ancients, and throughout the middle ages, that the limbs are destitute of joints, and that consequently an E. cannot lie down to rest like another quadruped, and if it were to lie down, could not rise again, but always sleeps standing, or leaning against a tree. It is indeed true that the E. often sleeps standing, and when fatigued, falls asleep leaning against a rock or tree, against which it may have been rubbing itself. The flexibility of the limbs is, however, sufficient to permit elephants to run with speed nearly equal to that of a horse, to indulge in playful gambols, and to ascend and descend steep mountains. Elephants are more sure-footed and serviceable than either horses or mules, in difficult mountain roads. On the very steepest declivities, an E. works his way down pretty rapidly, even with a *howdah* and its occupants upon his back, his chest and belly on the ground, and each forefoot employed in making a hole for itself, into which the hind-foot afterwards follows it, and to which the weight may be trusted, that another step may be ventured with safety. In lying down, the E. does not bring his hind-legs under him, like the horse and other quadrupeds, but extends them backwards (as man does when he assumes the kneeling position), an arrangement which, "by enabling him to draw the hind-feet gradually under him, assists him to rise almost without a perceptible effort." The E.'s pace, when exceeding a walk, is neither a trot nor a gallop, which would be too violent a motion for its conformation and huge body, but a sort of shuffle, the speed of which is increased or diminished without other alteration. The E. is incapable of springing like the deer, horse, and other animals which have the bones of their shoulders and hocks set at an angle.

The head in elephants is large; the neck is short and thick, the long flexible proboscis compensating both for the shortness of the neck, and for the inflexibility caused by the largely developed processes of its vertebræ, and enabling the animal readily to reach objects on the ground, or to a height of several feet above its head, or on either side. A great extent of bony surface in the head affords attachment for muscles destined to move and give power to the proboscis or trunk. This extent of bony surface is provided in a remarkable manner, which at the same time makes the head, heavy as it is, lighter in proportion to its bulk than is usual in quadrupeds; a great space separating the internal and external tables of all the bones of the skull, except the occipital bones, so that the space occupied by the brain is but a small part of the whole head. The space between the tables of the bones is occupied by cells, some of which are 4 or 5 in. in length; others are small, irregular, and honeycomb-like; "these all communicate with each other, and through the frontal sinuses with the cavity of the nose, and also with the tympanum or drum of each ear; consequently, as in some birds, these cells are filled with air." The huge and extraordinary bones of the skull, besides affording attachment for muscles, afford mechanical support to the tusks.

The nasal bones of the E. are scarcely more than rudimentary; but the tapering proboscis, to the very extremity of which the nostrils are prolonged, is nearly 8 ft. in length. Besides the great muscles connected with it at its base, it is composed of a vast multitude of small muscles variously interlaced, but chiefly either longitudinal, and divided into successive arcs, of which the convexity is outwards, or transverse, and

radiating from the internal to the external membrane. Cuvier states the number of muscles having the power of distinct action as not far short of 40,000. The trunk can be coiled around a tree, and employed to tear it from its roots; it is a formidable weapon of offense or defense, and is far more employed in this way than the tusks, even by those elephants which have tusks of great size; its extremity can be wound around a small handful of grass or a slender branch; it is even capable of plucking the smallest leaf, or of lifting a pin from the ground. To fit it for such actions as those last mentioned, and for many such as might be performed by a hand, it is furnished at the extremity with what may be likened to a finger and thumb; on the upper side, an elongated process—strong, soft, and flexible, like the rest of the trunk, and endowed with the most delicate sense of touch—on the under side, a kind of tubercle against which this process may be pressed. All the food of the E. is gathered and conveyed to the mouth by the trunk: by means of the trunk, also, it drinks, sucking up into it a quantity of water sufficient to fill it, and then discharging the contents into the mouth. Valves at the base of the trunk prevent the water from going too far up the nostrils. The trunk is constantly employed by elephants in providing in many ways for their comfort or enjoyment, as in throwing dust over their backs, or in fanning themselves and switching away flies with a leafy branch, two practices to which they are greatly addicted. Their mutual caresses are also managed by means of the trunk, and through it they make a loud shrill sound, indicative of rage, which is described by Aristotle as resembling the hoarse sound of a trumpet, and from which this organ received its French name *trompe*, corrupted in English into trunk. With the trunk, also, they sometimes, when angry, beat violently on the ground.

The sense of smell is very acute in the E., as is also that of hearing. The ears are large and pendulous; the eyes are small.

Elephants have no canine teeth, nor have they any incisors in the lower jaw. The upper jaw is furnished with two incisors, which assume the peculiar character of tusks, and attain an enormous size, a single tusk sometimes weighing 150 or even 300 pounds. The tusks are, however, often imperfectly developed, 10 or 12 in. in length, and 1 or 2 in diameter. These stunted tusks are often used for such purposes as snapping off small branches and tearing climbing plants from trees. Those elephants which possess great tusks employ them also for such other uses as loosening the roots of trees which they cannot otherwise tear from the ground; or in a state of domestication, for such labors as moving great stones, and piling or carrying timber. A powerful E. will raise and carry on his tusks a log of half a ton weight or more. The tusks of the E. surpass in size all other teeth of existing animals, and are the largest of all teeth in proportion to the size of the body. They consist chiefly of that variety of *dentine* called ivory (q. v.), and continue to grow—like the incisors of the rodents, to which they are in some respects analogous—even when the animal has attained a great age, if not to the very end of its life. The young E. is at first furnished with deciduous incisors, which are shed between the first and second year, and are succeeded by the permanent tusks.—The molar teeth of the E. are developed in succession; and at least in the Indian E., never more than two are to be seen in the same side of a jaw at one time. The first molars cut the gum in about two weeks after birth, and are shed about the end of its second year. The sixth molars, which are also believed to be the last, are supposed to appear about the fiftieth year of the E.'s life. The molar teeth of the E. are remarkable for their great size, and for the extreme complexity of their structure, to which the nearest resemblance is found in some of the small rodents. They are composed of vertical plates of bony substance, separately enveloped in enamel, and cemented together by a third substance, called *crusta petrosa*, *cortical*, or *cement*, more resembling bone than enamel. Each succeeding tooth is not only more complex, but occupies a greater space in the jaw than its predecessor. Although formed from a single pulp, the molar tooth of an E. resembles an aggregation of teeth; and in the earlier stages of its growth, when the cement is not yet deposited, it seems as if many separate teeth were soldered together. As the surface of the tooth is worn down by mastication, the harder enamel is exposed in elevated ridges. The whole of a tooth is not in employment at once. From the peculiar manner of its growth, the anterior part begins to be employed, and to be worn away, whilst the latter part is still in process of formation.

The digestive apparatus of the E. is similar to that of the other pachydermata; but the stomach, which is of a very lengthened and narrow form, exhibits a peculiarity which assimilates it to that of the camel; the internal membrane, at the extremity beyond the cardiac orifice, forming thick wrinkles and folds, the broadest of which, and nearest to the gullet, seems to act as a valve, making that end of the stomach a reservoir for water, capable of containing about ten gallons; whilst a peculiar muscle, connecting the windpipe and gullet, enables the animal to open this reservoir at pleasure, for the regurgitation of the fluid, which is then sometimes received into the trunk, and squirted over the body, to free it from the nuisance of flies or the heat of a tropical sun.

The female E. has only two teats, situated between the fore-legs. The young suck with the mouth, and not with the trunk. They are suckled for about two years. The period of gestation is also nearly two years, and a single young one is produced at a birth.

The skin of the E. is very thick, of a dark-brown color, and in the existing species has scarcely any covering of hair. The tail does not reach to the ground, and has a tuft of coarse bristles at the end. The feet have in the skeleton five distinct toes, but these are so surrounded with a firm horny skin that only the nails are visible externally, as on the margin of a kind of hoof. The foot of the E. is admirably adapted for steep and rough ground, the protective skin which covers the toes allowing them considerable freedom of motion.

Only two existing species of E. are certainly known, the Indian (*E. Indicus*) and the African (*E. Africanus*), although differences have recently been observed in the E. of Sumatra, which may perhaps entitle it to be ranked as a distinct species. Elephants are found in all parts of Africa, from the Sahara southwards, where wood and water are sufficiently abundant; also throughout India and the south-eastern parts of Asia, and in some of the tropical Asiatic islands. They extend northwards to the Himalaya; and Chittagong and Tiperah vie with Ceylon in the superior excellence of the elephants which they produce. The Indian E. is distinguished by a comparatively high oblong head, with a concave forehead; whilst the African has a round head and convex forehead. The ears of the African E. are much larger than those of the Indian, covering the whole shoulder, and descending on the legs. A marked distinction of the two species is also found in the molar teeth; those of the Indian E. exhibiting *wavy parallel transverse ridges*; whilst those of the African species have the divisions of the crown of the tooth fewer, broader, and *lozenge-shaped*.

Elephants live in herds, not generally numerous, but several herds often congregate together in the same forest or at the same place of drinking. Each herd has a leader, generally the largest and most powerful animal. The leader seems to exercise much control over the movements of the herd, gives the alarm in case of danger, and seems to examine and decide for the whole herd as to the safety of proceeding in any particular direction. On account of his tusks, the leader is very often the animal against which the efforts of the hunter are directed; but the rest of the herd do their utmost to protect him, and when driven to extremity, they place him in the center, and crowd so eagerly to the front of him that some of them must often be shot ere he can be reached. A family resemblance is usually very visible among the elephants of the same herd; some herds are distinguished by greater stature, and others by more bulky form and stronger limbs; some by particularly large tusks, some by slight peculiarities of the trunk, etc. In the East Indies, distinctions of this kind have long been carefully noticed, and particular names are given to elephants according to them, some being considered as *high-caste*, and others as *low-caste* elephants. An E. which by any cause has been separated from its herd, seems never to be admitted into another, and these solitary elephants are particularly troublesome, in their depredations exhibiting an audacity which the herds never exhibit; they are also savage and much dreaded, whilst from a herd of elephants danger is scarcely apprehended. The E. is generally one of the most inoffensive of animals, although in a state of domestication, it shows, as is well known, a power both of remembering and resenting an injury.

The favorite haunts of wild elephants are in the depths of forests—particularly in mountainous regions—where they browse on branches, and from which they issue chiefly in the cool of the night to pasture in the more open grounds. They are ready to plunder rice or other grain-fields, if not deterred by fences, of which, fortunately, they have, in general, an unaccountable dread, even although rather imaginary than real. A fence of mere reeds will keep them out of fields, where, as soon as the grain is removed, they enter by the gaps of the fence, and may be seen gleaning among the stubble.

When the E. eats grass, "nothing can be more graceful than the ease with which, before conveying it to his mouth, he beats the earth from its roots by striking it on his fore-leg." A cocoa-nut is first rolled under foot, to detach the outer bark, then stripped of the fibrous husk, and finally crushed between the grinders, when the fresh milk is swallowed with evident relish. The fruit of the palmyra palm is another favorite food of elephants, and they seem to have an instinctive knowledge of the time of its ripening. Sugar-canes are also a favorite food; indeed, elephants are very fond of sweet things. Those which are brought to Britain are generally fed on hay and carrots. The amount of daily food necessary for the E. in a state of domestication may be stated, on an average, at about 200 lbs. in weight.

Elephants delight in abundance of water, and enter it very freely, often remaining in it for a considerable time and with great evident enjoyment. They sometimes swim with not only the body but the head under water, the only part elevated above it being the extremity of the trunk.

The habits of the African E. appear in no important respect to differ from those of the Indian elephant. It is the latter only that is at the present day domesticated; but it is certain that the African species was anciently domesticated, and the figures on many Roman medals attest it.

Elephants rarely breed in a state of domestication, although, a few years ago, the birth of an E. took place in the zoological gardens of London, an occasion of much interest not only to the scientific but to the general public. They are generally tamed within a few months after they are captured; some degree of severity being employed

at first, which, however, as soon as the animal has begun to respect the power of man, is exchanged for kindness and gentleness of treatment. Elephants intended for domestication are captured in various ways. It was formerly common to take them in pitfalls, but in this way they were often much injured. Another method frequently practised is by the aid of tame elephants. Male elephants chiefly are captured in this way, the decoy elephants employed being females, trained for the purpose. With these the hunters very cautiously approach the animal they mean to capture, and he generally permits them to come up to him, and is so pleased to make the acquaintance of the female, that he takes no notice of their riders and other human attendants. Two of the females take their places, one on each side of him, and whilst he is occupied with them, men, the profession of whose lives it is, and who display a wonderful expertness in the work, contrive to get beneath their bodies, and to pass ropes round the legs of the intended captive. His two hind-legs are fastened together by 6 or 8 ropes in the form of the figure 8, another rope keeping them tight at the intersections, and a strong cable with a running-noose is attached to each hind-leg. About twenty minutes are usually spent in fixing the necessary ropes, profound silence being maintained if the process goes on unobserved, or some of the other hunters distracting the attention of the E. from those who are engaged in this work; and when at last, becoming sensible of his danger, he tries to retreat, an opportunity is soon found of tying him, by means of the long cables which trail behind him, to some tree strong enough for the purpose. His fury then becomes ungovernable, and he makes violent and prodigious efforts to get free, throwing himself on the ground, and twisting himself into the most extraordinary positions. It is not until he has thoroughly exhausted himself, and begins to suffer severely from fatigue, thirst, and hunger, that the next steps are taken towards taming him and making him a willing servant of man.

Still more wonderful is the capture of a wild E., sometimes by not more than two hunters, who for this purpose will go into the woods, without aid or attendants, their only weapon a flexible rope of hide. With this they secure one of the E.'s hind-legs, following his footsteps when in motion, or stealing close up to him when at rest, or sometimes spreading the noose on the ground, partially concealed by roots and leaves, beneath a tree on which one of the party is stationed, whose business it is to lift it suddenly by means of a cord. When arrested by the rope being coiled around a tree, the E. naturally turns upon the man who is engaged in making it fast, but his companion interferes on his behalf, by provoking the animal; and thus not only is the first rope made fast, but noose after noose is passed over the legs, until all are at last tied to trees, and the capture is complete; upon which the hunters build a booth for themselves in front of their prisoner, kindle their fires for cooking, and remain day and night till the E. is sufficiently tamed to be led away.

But these huge animals are not always captured singly; whole herds are often taken at once. This is accomplished by means of an inclosure, towards which the elephants are driven by great numbers of men encircling a considerable space, and contracting the circle by slow degrees. Weeks, or even months, are spent in this operation, and at last the elephants, hemmed in on every side except the mouth of the inclosure, enter it, and the gate is immediately closed. The modes of constructing the inclosure are different in different parts of the east. Tame elephants are sometimes sent into it, and the captives are in succession made fast to trees there, in a way somewhat similar to that practiced in capturing single elephants.

The E. first became known in Europe from its employment in the wars of the east: "in India, from the remotest antiquity, it formed one of the most picturesque, if not of the most effective, features in the armies of the native princes." Elephants have been taught to cut and thrust with a kind of scimitar carried in the trunk, and it was formerly usual for them to be sent into battle, covered with armor, and bearing towers on their backs, which contained warriors. But the principal use of the E. in war is for carrying baggage, and for dragging guns. An E. will apply his forehead to a cannon, and urge it through a bog, through which it would be almost impossible for men and cattle to drag it; or he will wind his trunk round it, and lift it up, whilst horses or cattle drag it forwards. Elephants are used in the east for carrying persons on their backs, a number being seated together in a *howdah*, whilst the driver (*mahout*) sits on the E.'s neck, directing it by his voice and by a small goad. Elephants have always a conspicuous place in the great processions and state displays of eastern princes, and white elephants—albinos—are peculiarly valued. Elephants are also employed in many kinds of labor, and display great sagacity in comprehending the nature of their task and adapting themselves to it. In piling timber, the E. "manifests an intelligence and dexterity which is surprising to a stranger, because the sameness of the operation enables the animal to go on for hours disposing of log after log, almost without a hint or direction from his attendant."

Of the sagacity of the E., many interesting anecdotes are on record, as every reader of books of travels and of natural history knows. But Cuvier refuses, and apparently with justice, to ascribe to it a degree of sagacity higher than that of the dog. In a state of domestication, the E. is a delicate animal, requiring much watchfulness and care, although naturally it has a very long life, and instances are on record of extreme longevity in domestication, extending not only to more than one hundred, but almost to two hundred years.

The numbers of wild elephants, in some parts both of the East Indies and of Africa,

are being gradually reduced as cultivation extends, and many are shot for no other reason than a desire to reduce their numbers, and put an end to their ravages on cultivated grounds. A reward of a few shillings per head was claimed for 3,500 destroyed in part of the northern province alone of Ceylon, in less than three years prior to 1848. It is for the sake of ivory that the greatest slaughter of elephants takes place. A ball of hard metal, skillfully planted in the eye, base of the trunk, or behind the ear, generally ends an E.'s life in an instant; and expert *sportsmen* have been known to kill right and left one with each barrel.

Fossil Elephants.—The E. makes its appearance in the pleistocene strata. Its nearly ally, the mastodon, whose remains are found associated with it, began life earlier; it has left its traces in miocene deposits. Ten species of fossil elephants have been described, the remains of three of which are found in Europe. The best known of these is the *elephas primigenius*, or mammoth, the tusks of which are so little altered as to supply an ivory which, though inferior to that of the living species, is still used in the arts, especially in Russia. Its tusks are, on this account, regularly searched for by "ivory hunters" in Siberia, where, in the superficial deposits of sand, gravel, and loam, the remains occur in enormous abundance. They are also found in similar strata all over Europe. In Britain, the localities that have supplied these remains are very numerous. They are especially abundant in the pleistocene deposits of the e. and s.e. of England. Woodward, in his *Geology of Norfolk*, calculates that upwards of 2,000 grinders of this animal had been dredged up by the fishermen off Happisburgh in thirteen years. The bone-caves also yield remains of this gigantic animal.

The mammoth truly belongs to the geological history of the world; it died out at the close of the period represented by the pleistocene beds. It is the only fossil animal that has been preserved in a perfect condition for the examination of man. In all other remains we have to deal with the hard portions only—the bones, teeth, scales, etc., and frequently only with fragmentary portions, requiring the skill of a Cuvier or an Owen to make from them an approximation to the perfect animal. But the mammoth has been preserved so that its flesh has been eaten by dogs, bears, and wolves. In 1799, a Tungusian, named Schumachoff, while searching along the shores of lake Oncoul for mammoth tusks, observed among the blocks of ice a shapeless mass, but did not at the time discover what it was. The heat of succeeding summers gradually melted the ice around it, and, in 1803, the mammoth fell on a bank of sand. In Mar. of the following year, the hunter visited it, cut off, and carried away the tusks, which he sold for fifty rubles. In 1806, Mr. Adams visited the locality, and examined the animal, which still remained on the sand-bank where it had fallen, but in a greatly mutilated condition. The Jakutski of the neighborhood had cut off the flesh to feed their dogs, and the wild beasts had almost entirely cleared the bones. The skeleton was, however, entire, excepting one of the forelegs, and some of the bones of the tail. Many of the bones were still held together by the ligaments and by parts of the skin. The head was covered with dry skin; one of the ears was well preserved; it was furnished with a tuft of hairs. Three fourths of the whole skin were procured, which was so heavy that ten persons found great difficulty in transporting it to the shore, a distance of 150 ft.; it was of a dark-gray color, and was covered with a reddish wool, and long black hairs or bristles. The wool was short, and curled in locks; the bristles were of different lengths, varying from 1 to 18 inches. Some of this covering still remained attached to the skin, but the great mass was entirely separated from it. Mr. Adams collected 36 lbs., although much of it had been destroyed from the dampness of the place where it had lain so long. The animal was a male, and had a long mane on the neck. The entire carcass was removed to St. Petersburg, where it is now preserved. The tusks were repurchased, and added to the animal. It measures from the fore part of the skull to the end of the mutilated tail 16 ft. 4 in.; the height to the top of the dorsal spines is 9 ft. 4 in.; the length of the tusks along the curve is 9 ft. 6 inches. Portions of the hairy covering have been brought to this country, and may be seen in the British museum.

Taking the teeth as exhibiting clearly a marked difference in the recent species, the mammoth is easily separated from both by its broader grinders, which have narrower, and more numerous, and close-set plates and ridges. The existence of the E. and other genera, whose representatives are now found only in the warmer regions of the earth, in the n. of Europe and Asia, led to the belief, that at the recent period in the world's history when they were its living inhabitants, a tropical temperature existed in the temperate zone, and stretched further n. towards the pole; but the discovery of this perfect animal showed that these huge elephants were adapted by their clothing to endure a cold climate, and by the structure of their teeth were able to employ as food the branches and foliage of the northern pines, birches, willows, etc. There are few generalizations more plausible at first sight than to predicate of an unknown species of a genus what is ascertained regarding the known members of the same genus. It required a striking case, such as that supplied by the discovery of the mammoth, to show clearly the fallacy of deductions which were almost universally received by scientific men not many years ago, which still occasionally mislead, and which may even now be met with in some popular hand-books of science.

ELEPHANT. An order of the E. was instituted in Denmark, by king Frederick II. The badge was a collar of elephants towered, supporting the king's arms, and having at the end the picture of the Virgin Mary.

ELEPHANT, SEA, *Macrorhinus proboscideus*, also known as the **ELEPHANT SEAL**, the **PROBOSCIS SEAL**, etc., is the largest of the seal family (*phocidae*), an inhabitant of the seas of the southern hemisphere. It is more than twice as large as an elephant, being sometimes 30 ft. in length, with a circumference of about 18 ft. at the thickest part, which is at the chest, immediately behind the fore-flippers or swimming paws; the body tapering towards the tail. The color is grayish, bluish gray, or more rarely blackish brown. The whole body is covered with very short hair, distributed in patches, giving it a spotted appearance somewhat like watered silk. The swimming paws are large and powerful; the fore-paws have five nails, the thumb-nail easily distinguishable from the others; the hind-paws have not even the rudiments of nails, but are beautifully constructed like the webbed foot of a bird, so as to expand, and increase the power of swimming. The true nail is very short, not more than 6 in. long. The head is larger in proportion than in many seals; the eyes are very large and prominent, with eyebrows of coarse hair; the whiskers are composed of very long and coarse spirally twisted hairs; there are no external ears; the canine teeth are remarkably large and massive, somewhat assuming the character of tusks. The nose of the males is very remarkable, being prolonged into a kind of proboscis of about a foot long, which, however, is not at all an organ of prehension, and, indeed, seems to serve no purpose whatever analogous to those which are served by the proboscis of the elephant, but in its ordinary state hangs flaccid on the face, becoming distended like the wattle of a turkey when the animal is roused to passion of any kind, and in particular presenting this distended appearance during the rutting season. At that season, also, the males have furious combats, the victor winning for himself a whole herd of females. When the proboscis is dilated, the voice of the sea-elephant, which usually is like the lowing of an ox, is completely changed, and becomes a loud and extraordinary gurgling.

Sea-elephants are found on Kerguelen's Land, Juan Fernandez, South Georgia, the States islands, South Shetland, the Falkland islands, etc. They migrate southwards at the beginning of summer, and northwards at the approach of winter, thus avoiding the extremes of heat and cold. A single individual sometimes yields 1400 or 1500 pounds or 70 gallons of excellent oil, on account of which these animals are pursued to an extent that seems to have already much reduced the numbers of the species. They are either shot or killed by means of long lances. Cuttle-fish and other cephalopods seem to be their principal food; but remains of marine plants have also been found in the stomach.

The skin of the sea-elephant is not at all valued on account of its fur, but its thickness and strength make it very useful for harness-making and similar purposes. The flesh is black, oily, and indigestible; the tongue (salted) alone being esteemed a delicacy. The principal product, however, is the oil, which burns slowly, with a clear flame, and without smoke or disagreeable odor. See illus., **MAMMALIA**, vol. IX.

ELEPHANTA, an island of 6 m. in circuit, stands in the harbor of Bombay (q.v.), about 7 m. to the e. of that city, and about 5 m. to the w. of the mainland. It takes this its European name from a huge figure of an elephant near its principal landing-place, which, however, appears to have gradually crumbled away. This colossal animal has been cut out of a detached rock, which is apparently of basaltic origin. Further towards the interior, three temples, dug out of the living mountain, present themselves—the roofs being supported by curiously wrought pillars of various forms and magnitudes, and the walls being thickly sculptured into all the varieties of Hindu mythology. The largest of the three excavations is nearly square, measuring 133 ft. by 130½ ft.; and immediately fronting its main entrance stands a bust or third-length of a three-headed deity, with a height of 18 ft., and a breadth of 23. These monuments of superstition, like the quadruped which guards, as it were, the approaches to them, are said to be rapidly decaying—a state of things which, besides in some measure accounting for the execution of such works, seems to be inconsistent with any very high antiquity. The island is in lat. 18° 57' n., and long. 73° east.

ELEPHANTIASIS is a term applied to two varieties of skin-disease, in which the limbs, from their enlargement, and from the changed condition of the skin, have a slight resemblance to those of the elephant. There is the *elephantiasis of the Greeks*, which is usually regarded as the same as the eastern leprosy, and as the *spedalskhed* of Norway; and the chief features of which are described in the article **LEPROSY**. In this affection, the size of the limbs and the state of the epidermis are comparatively slightly altered. In the *elephantiasis of the Arabs*, which seems to be identical with the *Barbadoes leg*, (q.v.), there is great enlargement of the affected parts, and the skin is much thickened.

ELEPHANTINÉ, a small island of the Nile, lying opposite to Assouan (q.v.), the ancient Syene, on the confines of Egypt and Nubia, in 24° 5' n. lat., and 32° 34' e. long. From this island, the Greek mercenaries were sent by Psammitichus I. to recall the Egyptian deserters, and it was garrisoned in the time of the Pharaohs, Persians, and Romans. The island was anciently called *Abu*, or the "ivory island," from its having been the entrepot of the trade in that precious material. The most important ruins are a gateway of the time of Alexander, and a small temple dedicated to Khnum, the god of the waters, and his contemplar deities, Anucis and Sate. This temple was founded by Amenophis III., and embellished by Rameses III. Another remarkable edifice is the ancient Nilometer, formerly mentioned by Strabo, and which appears to have been

built in the time of the Cæsars; and several remaining inscriptions record the heights of inundation from the time of Augustus to Severus. This island had the honor of giving a dynasty (the 5th) to Egypt, and was evidently an important place, the inscriptions on the rocks attesting the adoration paid by Sethos I., Psammitichus II., and other monarchs, to the local deities. Other interesting monuments have been found on this island: amongst which may be cited part of a calendar recording the rise of the dog-star in the reign of Thothmes III. (1445 B.C.), and numerous fragments of pottery—principally receipts in the Greek language—given by the farmers of the taxes in the reign of the Antonines. The island is at present inhabited by Nubians.—Wilkinson, *Topography of Thebes*, p. 460; Champollion, *Notice Descriptive*, p. 215; Champollion, *Lettres Érites*, pp. 111, 157, 171, 382.

ELEPHANT'S FOOT, or **HOTTENTOT'S BREAD** (*testudinaria elephantipes*), a plant of the natural order *dioscoreacea*, of which the root-stock forms a large fleshy mass, curiously truncate, or abruptly cut off at the end, so as somewhat to resemble an elephant's foot, and covered with a soft, corky, rough, and cracked bark. From this springs a climbing stem, which bears the leaves and flowers. The root-stock is used as food by the Hottentots. The plant is not unfrequently to be seen in hot-houses.

The name **ELEPHANT'S FOOT** (*elephantopus*) is also given, on account of the form of the root-leaves, to a genus of plants of the natural order *compositæ*, sub-order *corymbiferae*, one species of which (*E. scaber*) is common in elevated dry situations in all parts of India, and is used in Indian medicine in affections of the urinary organs.

ELETTA'RIA. See **CARDAMOMS**.

ELETZ. See **JELETZ**.

ELEUSINE, a genus of grasses, chiefly natives of India and other warm climates, several of which are cultivated as grains. This is especially the case with *E. corocana*, an Indian species, called natchnee and nagla ragee, also mand and murwa, which has aggregated digitate spikes finally incurved. The Thibetans make a weak sort of beer, much in use amongst them, from this grain. *E. stricta* is cultivated as a grain-crop in the same parts of the world, and is, like the former, extremely productive. The grain called tocusso in Abyssinia is also a species of this genus, *E. tocusso*.—A decoction of *E. Egyptiaca* is used in Egypt for cleansing ulcers; and a drink made from the seeds is regarded as useful in diseases of the kidneys and bladder. A decoction of *E. Indica* is also administered to infants in Demerara, to prevent or cure convulsions.

ELEUSINIAN MYSTERIES, the sacred rites with which the annual festival of Ceres was celebrated at Eleusis. Many traditions were afloat in ancient times as to the origin of this festival. Of these, the most generally accepted was to the effect that Ceres, wandering over the earth in quest of her daughter Proserpine, arrived at Eleusis, where she took rest on the *sorrowful stone* beside the well Callichorus. In return for some small acts of kindness, and to commemorate her visit, she taught Triptolemus the use of corn on the Rharian plain near the city, and instituted the mystic rites peculiarly known as hers. The outward method of the celebration of these mysteries is known with considerable accuracy of detail. Their esoteric significance is very variously interpreted. The ancients themselves generally believed that the doctrines revealed to the initiated gave them better hopes than other men enjoyed, both as to the present life and as to a future state of existence. Modern speculation has run wild in the attempt satisfactorily to explain these mysteries. As reasonable a solution as any other seems to be that of bishop Thirlwall, who finds in them "the remains of a worship which preceded the rise of the Hellenic mythology and its attendant rites, grounded on a view of nature, less fanciful, more earnest, and better fitted to awaken both philosophical thought and religious feeling." The festival itself consisted of two parts, the greater and the lesser mysteries. The less important feast, serving as a sort of preparation for the greater, was held at Agræ, on the Ilissus. The celebration of the great mysteries began at Eleusis on the 15th day of Boëdromion, the third month of the Attic year, and lasted over nine days. On the first day (called *agurmos*, the assembling), the neophytes, already initiated at the preparatory festival, met, and were instructed in their sacred duties. On the second day (called Haladé, *mystæ*, *To the sea, ye initiated!*), they purified themselves by washing in the sea. On the third day, sacrifices, comprising, among other things, the mullet-fish, and cakes made of barley from the Rharian plain, were offered with special rites. The fourth day was devoted to the procession of the sacred basket of Ceres (the Kalathion). This basket, containing pomegranates, salt, poppy-seeds, etc., and followed by bands of women carrying smaller baskets similarly filled, was drawn in a consecrated cart through the streets, amid shouts of "Hail, Ceres!" from the onlookers. The fifth day was known as the "day of the torches," and was thought to symbolize the wanderings of Ceres in quest of her daughter. On the *mystæ*, led by the "daduchus," the *torch-bearer*, walked two by two to the temple of the goddess, and seem to have spent the night there. The sixth day, called Iacchus, in honor of the son of Ceres, was the great day of the feast. On that day the statue of Iacchus was borne in pomp along the sacred way from the Ceramicus at Athens to Eleusis, where the votaries spent the night, and were initiated in the last mysteries. Till this stage of the proceedings, they had been only *mystæ*; but on the night of the sixth day they were admitted into the innermost sanctuary of the temple, and, from being allowed to behold the sacred things, became

entitled to be called "epoptæ," or "ephorî," i.e., *spectators*, or *contemplators*. They were once more purified, and repeated their original oath of secrecy with an imposing and awful ceremonial, somewhat resembling, it is believed, the forms of modern freemasonry. On the seventh day, the votaries returned to Athens with mirth and music, halting for a while on the bridge over the Cephissus, and exercising their wit and satire against the spectators. The eighth day was called *Epidauria*, and was believed to have been added to the original number of the days for the convenience of those who had been unable to attend the grand ceremonial of the sixth day. It was named in honor of *Æsculapius*, who arrived on one occasion from his native city of *Epidaurus* too late for the solemn rites, and the Athenians, unwilling to disappoint so distinguished a benefactor of mankind, added a supplementary day. On the ninth day took place the ceremony of the "*Plemochœ*," in which two earthen vessels filled with wine were turned one towards the e., and the other towards the west. The attendant priests, uttering some mystic words, then upset both vessels, and the wine so spilt was offered as a libation.

Initiation into the Eleusinian mysteries was compulsory on every freeborn Athenian; but slaves, prostitutes, and persons who had forfeited their citizenship were excluded from the rites. During the period of the festival, none of those taking part in it could be seized or arrested for any offense. *Lycurgus*, with a view to destroying distinctions of class, forbade any woman to ride to the Eleusinia in a chariot, under a penalty of 6,000 drachmæ. The mysteries were celebrated with the most scrupulous secrecy. No initiated person might reveal what he had seen under pain of death, and no uninitiated person could take part in the ceremonies under the same penalty. The priests were chosen from the sacred family of the *Eumolpidæ*, whose ancestor, *Eumolpus*, had been the special favorite of *Ceres*. The chief priest was called the "*Hierophant*," or "*Mystagogue*;" next in rank to him was the *Daduchus*, or *Torch-bearer*; after them came the "*Hiero-Ceryx*," or sacred herald, and the priest at the altar. Besides these leading ministers, there was a multitude of inferior priests and servants.

ELEUSIS, a celebrated t. in ancient Attica, stood near the northern shore of the gulf of *Salamis*, and not far from the confines of *Megaris*. It was famous as the chief seat of the worship of *Ceres*, whose mystic rites were here performed with great pomp and solemnity from the earliest authentic times till the era of *Alaric*. See **ELEUSINIAN MYSTERIES**. The temple of the goddess, designed by *Ictinus*, the architect of the *Parthenon*, was the largest sacred edifice in Greece. The site of the old Eleusis is now occupied by the little village of *Lefsina* or *Lepsina*.

ELEUTHERA, one of the Bahamas (q.v.), is, next to *New Providence*, the most populous island in the whole chain. Including its dependent *cayos* or *keys*, E. has a pop. of about 3000. It is more fertile than most of its neighbors, more especially surpassing all of them in the growth of fruit, such as the pine-apple, the orange, and the lemon.

ELEUTHERIA, was a festival of the Greeks, to commemorate their deliverance from the invader *Xerxes*, instituted after the battle of *Platæa*, 479 B.C. There was a semi-military parade, eulogies on the heroes who fell in the great battle, the sacrifice of a bull to *Jupiter* and *Mercury*, and the sprinkling of the ground with wine.

ELEUTHERIA BARK, a name not infrequently given to the bark of the *croton eleutheria*, also known as *cascarilla bark*. See **CASCARILLA**. It is called *eleutheria* (or *eleuthera*) bark, because it is chiefly gathered on the island of *Eleuthera*.

ELEVATED. Wings turned upwards are described in heraldry as *elevated*.

ELEVATION, in architectural drawing, is the representation of the flat side of a building, drawn with mathematical accuracy, but without the slightest attention to effect. In art, again, elevation is a raising of the subject beyond its ordinary character in real life. A very good instance of elevation in this sense is given by *Fairholt* in his *Dictionary of Terms in Art*, in *Rembrandt's* "*Adoration of the Shepherds*." The whole of the objects and surroundings of the infant Saviour are of the most homely description; and still the light which is represented as issuing from his person gives an elevation to the scene which takes off from it entirely the character of being commonplace or vulgar.

ELEVATION, in astronomy and geography, means generally the height above the horizon of an object on the sphere, measured by the arc of a vertical circle through it and the zenith. Thus, the elevation of the equator is the arc of a meridian intercepted between the equator and the horizon of the place. The elevation of the pole is the complement of that of the equator, and is always equal to the latitude of the place. The elevation of a star, or any other point, is similarly its height above the horizon, and is a maximum when the star is on the meridian.

ELEVATION OF THE HOST (see *Host*). Members of the church of Rome worship the host under the assumption that the bread and wine in the Lord's supper are transubstantiated into the real body, blood, and divinity of Christ, who is, on each celebration of the sacrament, offered up anew as a victim (*hostia*) by the priests. The council of Trent, having determined that upon consecration the bread and wine of the sacrament are changed into the body of the Lord Jesus Christ, true God and true man, gave this decision: "There is, therefore, no room to doubt that all the faithful in Christ are bound to venerate this most holy sacrament, and to render thereto the worship of *latria*, which is due to the true God according to the constant usage of the Catholic

church." In conformity with this decision, the rubric of the missal says: "Having uttered the words of consecration, the priest immediately, falling on his knees, adores the consecrated host; he rises, shows it to the people, places it on the corporale, and again adores it." Rising up after he has adored it, he elevates it before the people, who, as soon as they see it (having notice also by the ringing of the bell), fall down in humble adoration to it as if it were God himself. They pray to it, and use the same acts of invocation as they use to Christ. The host is also elevated for worship when it is carried through the streets in solemn procession, on its way to the dwellings of the sick, or on the feast of Corpus Christi, or before the pope. The custom of thus elevating the host was introduced into the church of Rome in 1216, the year after transubstantiation was made an article of faith. Pope Honorius then ordered that the priests, at a certain point of the mass service, should lift up the host and cause the people to prostrate themselves in worshipping it.

ELEVATOR, a mechanical contrivance for raising goods or passengers from a lower story of a building to a higher. The most usual form of E. consists of a car or an open platform, the former being used for passengers and the latter for goods, which is moved up and down a vertical square well or shaft, called the elevator shaft, by mechanism set in motion either by steam or hydraulic power. Elevators of this kind are very frequent in hotels and warehouses. A grain elevator is a very different contrivance, used in grain mills and storehouses for discharging the grain from vessels and lifting it from one floor to another: it consists sometimes of a series of boxes or buckets attached to a belt traveling round two drums, one above and one below; sometimes of a rotating archimedeian screw which draws the grain along channels or pipes either vertical or inclined. In this country a grain elevator, by a misuse of words, has grown to mean a building in which grain is handled and stored.

With the increasing growth of high office buildings and stores, elevators are now in almost universal use in such buildings, which frequently rise to 20 or 25 stories. For such heights as these, high speed elevators have become necessary, and in some buildings as many as 15 or more passenger elevators are in constant use. The two most approved types of elevators are the hydraulic and the electric, which have almost entirely superseded the steam elevator, or those in which the steam engine acts directly upon the elevator cables. The chief advantages of the hydraulic and electric elevators is their safety and easy control by the operator when running at high speed. The hydraulic elevator is operated by a long water cylinder in which a piston or plunger is raised by water pumped into the cylinder. The piston rod is connected by means of multiplying sheaves to the car so that for one foot of motion of the piston the car moves several feet. The speed of the car is regulated by the rate at which the water is admitted or discharged from the cylinder.

Electric elevators are of several kinds. In the simplest kind the electric elevator turns a drum on which the elevator cable is wound. In a more recent, and perhaps the safest form of elevator, the sheaves are carried by a large nut, which travels back and forth on a long screw. The screw may be 20 or 30 feet long and is revolved by an electric motor directly connected to one end of it. The motor is started, stopped, and varied in speed by a switch placed in the elevator car.

Safety attachments of some kind are always provided to prevent the car from falling in case of a break in any part of the mechanism. These are very numerous in design, but in general consist of some kind of a governor which, when the cable breaks or the car descends faster than a determined speed, releases two catches on either side of the car, which take hold of toothed racks on either side of the shaft and prevent the car from falling.

ELEVENTH, in music, is the interval of the octave above the fourth.

ELF, a fairy, pl. **ELVES**. See **FAIRIES**.

ELF-ARROW-HEADS, **ELFIN-ARROWS**, **ELF-BOLTS**, **ELF-DARTS**, **ELF-SHOT**, and **ELF-STONES**, names popularly given in the British islands to the arrow-heads of flint which were in use at an early period among the barbarous tribes of this country and of Europe generally, as they are still in use among the American Indians, the Esquimaux of the Arctic regions, and the inhabitants of some of the islands in the Pacific ocean. It was believed that elves or fairies, hovering in the air, shot these barbs of flint at cattle, and occasionally even at men. Thus, Robert Gordon, of Straloch, an accomplished country gentleman of the n. of Scotland, writing in 1654, tells how one of his friends, traveling on horseback, found an elf-arrow-head in the top of his boot, and how a gentlewoman of his acquaintance, when out riding, discovered one in the breast of her habit. He remarks that, although they are got by chance in the fields and on the highways, one who goes to look for them on purpose will search in vain. He adds that they are most commonly met with after showers—a circumstance which probably helped them in Germany to their names of "thunder-bolts" and "thunder-stones," and is easily enough explained. The rain, by washing away the earth in which they have been imbedded, makes them more readily perceptible to the eye, especially if the sunshine happens to fall upon them. Cattle dying suddenly in the fields were believed to have been struck by elf-arrows—a belief which yet lingers in Ireland, and perhaps in some secluded parts of Scotland. "Thus, when cattle are sick," writes Mr. W. R. Wilde, in his *Catalogue of the Antiquities in the Museum of the Royal Irish Academy* (Dub. 1857), "and the cattle doctor, or fairy doctor, is sent for, he says the beast has been 'elf-shot,' or stricken

by fairy or elfin darts; and he forthwith proceeds to feel the animal all over; and, by some legerdemain, contrives to find in its skin one or more poisonous weapons, which, with some coins, are then placed in the water which is given it to drink; and so a cure is said to be effected." The elf-arrow-head was occasionally set in silver, so as to be worn on the person as a talisman, or had a hole drilled through it, so that it might be dipped in water, which, being thus endowed with healing virtue, was used sometimes as a wash, more commonly as a draught. See FLINT IMPLEMENTS AND WEAPONS.

EL-GHOR, "*the valley*," is, according to Robinson (*Phys. Geog.*, p. 73), the name now given to the northern part of the great depression which extends from the base of Mt. Hermon to the Red sea. The southern part retains the old Hebrew name, El-Arabah (q.v.), the boundary between the two being the range of chalk cliffs about 6 m. s. of the Dead sea. The length of El-Ghor, from the sea of Galilee to the Dead sea, is about 65 m., and between these points there is an average descent of over 10 ft. to a mile. The width of the valley varies from about 6 m. at the northern end to 10 or 12 in the neighborhood of Jericho. On the w. is a series of irregular and precipitous cliffs from 800 to 1200 ft. high, everywhere naked and desolate; on the e. the mountains are still higher. About 22 m. s. of the sea of Galilee the ridge Kum Surtabeh, crossing the valley obliquely, divides it into the upper and lower Ghor. At this point there is a sudden "breakdown" in the bed of the Jordan. Above it the valley is generally well watered and fertile; below, it becomes dry and desolate, being covered with a white nitrous crust. Within the general valley of El-Ghor there is a still lower depression, varying from a quarter to a half of a mile in width, through which the Jordan (q.v.) flows.

ELGIN, a co. in the province of Ontario, Canada, on lake Erie and Thames river; intersected by the London and Port Stanley railroad; 725 sq. m.; pop. '91, 42,109. The co. town is St. Thomas.

ELGIN, a city in Kane co., Ill., on Fox river, the Chicago, Milwaukee, and St. Paul, and the Chicago and Northwestern railroads; 36 m. w. of Chicago. The city is on both sides of the river, which affords abundance of water-power. The Elgin National Watch company is the most important manufacturing establishment. The city is the centre of a fine agricultural region, and has large sales of butter and cheese. E. has a high school, Elgin academy, St. Mary's academy, graded system of public schools, the Illinois Northern Hospital for the Insane, Sherman hospital, Gail Borden public library, Lord's, Highland, and Gifford parks, electric lights and street railroads, improved water works, several banks, numerous churches, and daily and weekly newspapers. Besides watches, butter, and cheese, the principal industries are the manufacture of sewing-machines, bicycles, shoes, silver-plated ware, and lumber. Pop. '90, 17,823; estimated in '97 to be 22,000.

ELGIN, a royal burgh, the co. t. of Elgin or Morayshire, and a station on the Inverness and Aberdeen Junction railway, situated on the right bank of the river Lossie, about 5 m. from the sea. Pop. '91, 7799. E. joins with Banff, Peterhead, Inverurie, Cullen, and Kintore, in returning a member to parliament. It was probably a royal burgh so early as the reign of King David I. (1124-53), and had its privileges confirmed by several of his successors. E. is chiefly remarkable for the beauty of its situation, lying placidly in a gentle curve of the Lossie, for the salubrity of its climate, and for its history as the see of the bishop of Moray. The old town was partially burned in 1390 by the notorious Wolf of Badenoch (Alexander Stewart, earl of Buchan); in 1402 by Alexander, the son of the lord of the Isles; and in 1452 by the earl of Huntly—this last calamity originating the proverb, "Half done, as Elgin was burned." Its once magnificent cathedral church, partly of early English and partly of middle-pointed architecture, dedicated to the Holy Trinity, was begun by bishop Andrew Moray in 1224, on the transference of the see from Spynie; was injured by fire in 1270; was nearly burned down by the Wolf of Badenoch in 1390; was restored under bishops Bur, Spynie, Innes, and Leighton (1390-1424); and from subsequent accident and dilapidation is now a mere ruin. The other religious buildings of the olden time were the church of St. Giles, a picturesque example of our old parish churches, replaced 1826-28 by the modern less interesting structure; the monastery of the Black Friars, long since demolished; the convent of the Gray Friars, the walls of whose church remain; the hospital of the Maison Dieu, on the site of which is Anderson's institution; the Leper house, still commemorated by the grounds called the Leper lands; and the chapel of St. Mary of the castle, which gave name to the Lady hill and Lady well on the w. of the town. The castle itself, styled of old the manor of Elgin, whose ruins, surmounted by an obelisk—erected to the memory of George, fifth and last duke of Gordon—crowned the Lady hill, was a residence of the earls of Moray, for some time superiors of the burgh.

ELGIN, THOMAS BRUCE, Earl of, 1766-1841; the seventh of the line, succeeding his brother in the earldoms of Elgin and Kincardine when but seven years old. He received his education at Harrow and Westminster, and, later, at the university of St. Andrews and at Paris where he studied international law and in Germany where he devoted his time to military studies. He then entered the army and rose to be general; was envoy at Brussels, at Berlin, and at Constantinople from 1799 to 1802. While at the latter place he secured and removed from Athens the sculptures known as the "Elgin marbles," now in the British museum. (See ELGIN MARBLES.) Lord Elgin was a representative peer of Scotland for more than 50 years.

ELGIN AND KINCARDINE, Earl of, Governor-General of India, James Bruce, eighth earl of E., was b. in Park Lane, London, in 1811. He was educated at his father's seat, in Fifeshire, and afterwards went to Christ Church, Oxford, where he was first-class in classics, 1832; became fellow of Merton, and graduated M.A., 1835. He

entered public life in 1841, when, as lord Bruce, he was returned at the general election on the conservative interest for Southampton. A petition was presented against the return, and the election was declared void. Before, however, a new writ could issue, lord Bruce had succeeded his father (who enriched the British museum by the invaluable collection of sculpture known as the "Elgin marbles," q. v.) as earl of Elgin. Those who remember his early parliamentary and pre-colonial career, state that he gave early promise of oratorical distinction, and assert that if he had thrown himself into the politics of the day, he would have taken a high position as a parliamentary debater. By succeeding to a Scotch peerage, however, he was, in his own words, "expelled from the house of commons without being admitted into the house of peers." Being offered the governorship of Jamaica, in Mar., 1842, by the earl of Derby—then lord Stanley—he went to Jamaica, where he administered the affairs of the island with so much ability and success, that in Aug., 1846, the governor-generalship of Canada was tendered to him by earl Grey, then secretary of state for the colonies in the administration of lord J. Russell. Lord E., still finding himself in the same position as a Scottish peer, accepted the office, and went to Canada. His administration of the government of Canada will ever be a bright spot in our colonial history, and a model to future governors of English dependencies. He found Canada governed by cliques, and torn by intestine feuds. With admirable tact and entire success, he inaugurated a system of self-government, which has rendered the provinces of British America a support to the British throne, in place of being a source of weakness. Under his government, Canada made such strides in importance and prosperity, that between 1847 (in the beginning of which year he entered upon his government) and 1855, when he returned to England, the revenue of that great British possession quadrupled itself. During his administration, he successfully negotiated a treaty for reciprocity of trade between British America and the United States, which admitted the whole produce of British North America to be brought into competition with the products of the United States in their own markets. This treaty, till it was renounced by the United States in 1866, put an end to the risk of collision as to the fisheries between this country and America, which lord E. described as the most serious risk which had presented itself during his public service. His popularity was great, not only in Canada but the adjacent states, the citizens of which offered him ovations. He was now a peer of the United Kingdom (having been summoned to the house of lords in 1849), and was appointed lord-lieutenant of Pifeshire. In 1857, the affair of the *lorcha Arrow*, and the bombardment of Canton, by sir John Bowring, led lord Palmerston to invite lord E. to go to China as plenipotentiary extraordinary. An army was equipped to carry out the policy prescribed by the British government, and he started on his mission. But before he could approach his destination, and when he had barely left England a month, the Indian mutiny broke out. Lord E. did not hesitate a moment in preferring the safety of India to the success of his Chinese negotiations. He dispatched the Chinese expedition to lord Canning's assistance, and the English in India were thus enabled to hold their ground until further reinforcements arrived. After thus consigning himself to an inaction of several months, lord E. proceeded to China, and in 1858, in conjunction with baron Gros, the French plenipotentiary, he negotiated the treaty of Tientsin, which promised to give Great Britain a freer access to China than she had ever enjoyed before. He found time, before his return, to negotiate a treaty with Japan, under which English manufactures are admitted at low rates of duty, and a British minister is permitted to reside at Jeddo. On his return home, he was appointed postmaster-general. He had scarcely time to become acquainted with his duties, before the treachery of the Chinese, in firing upon the British squadron from the Taku forts, led to the organization of another Chinese expedition, and to lord E.'s second mission to China. A combined English and French force penetrated to the capital, and enabled lord E. and baron Gros to dictate a peace under the walls of Peking. On the expiration of viscount Canning's term of service, the governor-generalship of India was offered by lord Palmerston to lord E. (1861), and accepted by him. He died in India, Nov., 1863. Lord E. (who was the representative in the male line of the great Scottish house of Bruce) was twice married: in 1841, to the daughter of Mr. Cumming Bruce, M.P. (she died 1843); and in 1846, to the daughter of the first earl of Durham, by whom he had a son, Victor Alexander, ninth earl, born 1849, and appointed viceroy of India in 1893. Lord E. was K. T. (1847), privy councilor (1857), G.C.B., civil, extra (1858).

ELGIN MARBLES, a celebrated collection of ancient sculptures, brought from Greece by Thomas, seventh earl of Elgin, and acquired from him for the British Museum in 1816, at the sum of £35,000.

These sculptures adorned certain buildings on the Acropolis of Athens; the chief portions, which are from the Parthenon or temple of Minerva, were designed by Phidias, and executed by him, or under his superintendence. They consist of—1. Portions of several of the statues that were placed in the e. and w. tympana or pediments, the most important of which are the Theseus or Hercules, Ilissus or river-god, upper portions of the torsos of Neptune and Minerva, Iris, torso of Cecrops, Ceres, and Proserpine, the Fates, heads of the horses of Hyperion, and one of the horses of Night. Of all these, the Theseus, and the head of the horse of Night, are the most perfect, the former wanting only the hands and feet and part of the nose, while even the surface of the latter is

very little injured. But however mutilated, the greatness in style of these magnificent works is clearly manifest, and from the merest fragment valuable instruction in art may be obtained. 2. Fifteen metopes, executed in high relief, representing the battle of the Centaurs and Lapithæ. A metope is the interval between the triglyphs on a Doric frieze—in the Parthenon there were 92, 14 on each front, and 32 on each flank of the temple—and on every metope, a Centaur engaged in conflict with one of the Lapithæ is represented in a style of the highest excellence in point of spirit and truthfulness. 3. A large portion of the frieze of the outer walls of the cella. This remarkable work represents the solemn procession to the temple of Minerva during the Panathenic festival, and has never been equalled for elegance of composition and the variety and gracefulness of the figures. It is executed in low relief, in order to adapt it to the light, for placed within the colonnade, it received its light between the columns, and by reflection, from the pavement below. This exquisite frieze occupied, slab after slab, a space of 524 ft. in length. The remains of it in the British museum on slabs and fragments of marble are to the extent of upwards of 249 ft., besides 76 ft. in plaster casts.

Although the Elgin marbles are now acknowledged to be the most precious collection existing of specimens of Greek art in its purest state, yet it was only after very considerable hesitation that government consented to purchase them, and then the sum awarded was not only far short of anything like a fair value, if indeed a value could be put on such treasures, but lord Elgin was left largely out of pocket after all his exertions. Again, from petty jealousy, some of the connoisseurs of the day, who had earned a sort of reputation from their collections—of whom Mr. Payne Knight may stand for the type—made strong efforts to underrate these great works; while others, like lord Byron, from feelings apparently generous, but quite mistaken, because not based on fact, heaped obloquy on lord Elgin, and opposed their acquisition. But it has been clearly proved that lord Elgin, so far from destroying, has saved these masterpieces from destruction. It was not to be expected but that foreigners would grudge this country such an acquisition, but certainly it is remarkable that such opinions should have been expressed in this country. The view adopted by a foreigner, who has devoted much attention to the subject, M. Viardot, author of *Les Musées d'Europe*, may be accepted as that generally taken abroad; and it is very different from that at one time so pertinaciously maintained by many in England. M. Viardot remarks: "It is said that, to justify the appropriation of the Lahore diamond, the English allege that if they have taken it, it was merely to prevent its appropriation by others. They may give the same excuse for their appropriation of the marbles of the Parthenon. No doubt, lord Elgin has carried them off; and the Greeks of the present day, seeing the old temple of their Acropolis despoiled of all its ornaments, have a good right to curse the spoiler. But when we think of the devastation these works have so often experienced, the total destruction of the principal statues, and the shameful mutilation of the others, and the risk these last ran of being entirely destroyed in their turn—when we consider that these precious relics of art are conserved in a place of surety, and placed in the center of artistic Europe, one loses the desire and almost the right to charge the English with piracy and robbery. For my part, if, in the course of my long devotion to the marbles of Phidias, a regret has come to trouble the ardent pleasure of my admiration, it was, that the robber of these marbles was not a Frenchman, and their resting-place the museum of Paris."—In 1891 an agitation was begun in London in favor of returning the Elgin marbles to Greece, but, though many newspaper and magazine articles advocated this restoration, the movement came to nothing. See *illus., SCULPTURE*, vol. XIII.

ELGINSHIRE, **MO'RAYSHIRE**, or **MURRAYSHIRE**, a maritime co. in the n.e. of Scotland, on the Moray firth. It contains 476 sq.m., and is 30 m. long and 20 m. broad. About a third part was formerly cut off on the s. by a detached part of Inverness-shire; but by an act of parliament, passed in 1870, this part was annexed to Inverness-shire, and a part of the intervening portion of Inverness-shire, of about the same extent, rental, and population, was annexed to Elginshire. In the s. are the high rugged Monadhliadh mountains of Inverness-shire, dividing the basins of the Spey and Findhorn, and forking in the n. to include the basin of the Lossie. In the s., gneiss predominates, with a little granite; and in the n., sandstone with fish and reptilian remains, and small patches of oolitic and Wealden strata. West of the Findhorn mouth are the sand-dunes of Culbin, 3 sq.m. in extent, some of them rising 118 feet. Great masses of peat and trunks of trees are often cast ashore near the mouth of the Findhorn. The climate is mild and dry, and the co. has been called the Devonshire of Scotland, the mountains of Aberdeenshire and Banffshire protecting it from the cold moist winds of the German ocean. The soil is open, sandy, and gravelly, and very fertile in the n., with some deep loams and clays. Pop. '81, 43,788; '91, 43,471.

ELI, the high-priest of Israel in the latter part of the period during which the ark of the covenant remained at Shiloh. That he was of the family of Ithamar, the youngest son of Aaron, is shown by comparing several passages of Scripture. He was probably the first high-priest in that branch of Aaron's family. His sons having died before him, the office passed to his grandson, Ahitub, and continued in his family until Solomon removed Abiathar and made Zadoc, a descendant of Eleazar, high-priest. Eli was also

judge over Israel for a period of 40 years, beginning, probably, soon after the death of Samson, and extending to his own death. If his languid reproofs of the wickedness of his sons were fair specimens of his general administration, he must have been a very inefficient magistrate. The divine judgment came at length on his house for the iniquity which he knew was practiced but did not strive to arrest. His sons made themselves vile, and he restrained them not. The sentence against them, pronounced first by a prophet and afterwards by the child Samuel, was executed in a battle with the Philistines, during which the ark of God was taken and the dissolute priests were slain. When Eli, then 98 years old, heard the news, he fell backward from his seat and died.

ELIA. See LAMB, CHARLES.

ELI'AS, ST., a lofty mountain which occupies a conspicuous position on the n.w. coast of America, in lat. 60° 18' n., and in long. 140° 30' west. Various authorities have estimated its height at from 12,661 to 19,500 feet, and it is estimated by the U. S. Coast and Geodetic survey to be 18,100. It is on the boundary between Alaska and the Dominion of Canada. Its ascent has been a matter of great difficulty, owing to the fact that the snow line descends to 2,000 or 3,000 feet above sea-level, but attempts to reach the summit have been made, among the most noteworthy of which was that of Prince Louis of Savoy, on July 31, 1897.

ELIAS LEVITA, 1472-1549; b. Bavaria; the most distinguished Hebraist of his time. Banished because he was a Jew, he went to Italy early in the 16th c., taught Hebrew at Venice and Padua, and lectured and wrote on Hebrew grammar. In 1512, he went to Rome, where he was so friendly with high dignitaries of the church, that he was accused of apostasy. His latest years were spent in Venice. He was the author of many works, of which the most valuable are those in Hebrew philology.

ÉLIE DE BEAUMONT, JEAN BAPTISTE ARMAND LOUIS LÉONCE; 1798-1874; b. France; professor of geology in the Paris school of mines; in 1833, engineer in chief of the mines of France; senator of France in 1852, and on the death of Arago chosen perpetual secretary of the academy of sciences. His best service to science was in connection with the geological map of France, on which he was employed for 18 years.

ELIGIUS, better known as **ST. ELOI**, or **ELOYSIUS**, one of the most illustrious names in the ecclesiastical history of France, was born near Limoges, about 588 A.D. He early manifested a taste for designing, and was placed by his parents with the master of the mint at Limoges, where he learned the goldsmith's trade, and became the most celebrated artist of his time. He was coiner to Clotaire II. of France, and later, to his son and successor, Dagobert I., who also made him his principal minister. Both kings employed him with important works, among which were two chairs of gold, adorned with jewels, which at that time were reckoned *chefs-d'œuvre*, also many ornaments for churches and tombs. But, although amassing great wealth, he acquired great distaste for it, and devoted much of it to deeds of piety, especially to the redemption of slaves, of whom it is said he sometimes emancipated a hundred at once. From his high position at court he was able to use much influence over the king in obtaining large donations for founding hospitals, churches, and monasteries. In 640 he was made bishop of Noyon, and held the office eighteen years. He died in 659. See Neander, *Light in Dark Places*.

ELIJAH (in the Greek form, occurring in the New Testament, Elias), the greatest of the prophets of Israel, was born at Tishbe, in Gilead, on the borders of the desert. He comes upon the scene in the time of Ahab, about 920 B.C. When that monarch, to please his Phœnician wife Jezebel, had introduced, on an extensive scale, the worship of Baal, E. pronounced a curse on the *land*. The prophet had to flee. He took refuge by the brook Cherith, probably one of the torrents that cleave the high table-land of his native region. Here he was miraculously fed by ravens. He then went to Zarephath, a town lying between Tyre and Sidon. Here he lodged with a widow woman, prolonged her oil and meal, and brought back her son to health from the brink of the grave. Subsequently, he made a temporary reconciliation with Ahab, and on Mt. Carmel executed dreadful vengeance on the prophets of Baal, slaying 400 with his own hand. Such a deed enraged Jezebel to the utmost. She swore to destroy the prophet, who once more took refuge in flight. He rested not till he reached Beersheba in the far south, on the edge of the desert that leads down to Sinai. The brief allusion in Scripture to his weary wanderings is very touching. At last he comes to Horeb, where he has an interview with Jehovah. The passage in which this is recorded is one of the grandest and most significant in the whole of the Old Testament. He then receives certain instructions from Jehovah, among others that he should select Elisha to be prophet in his room. E.'s next appearance is when Ahab rides forth to take possession of Naboth's vineyard: he denounces the murderous monarch, and utters an awful prophetic curse on him and his wife. After the death of Ahab, he rebukes the idolatries of his son Ahaziah in a solemn and bloody fashion; and after the death of Ahaziah, we find him interfering in the affairs of the king of Judah, who had married a daughter of Ahab, and had begun to "walk in the ways of the kings of Israel." He denounced his evil doings, and predicted his death. The closing scene of his life on earth is exquisitely narrated. A chariot of fire and horses of fire appeared after Elisha, and he had crossed the Jordan, and "Elijah went up by a whirlwind into heaven."

ELIMINATION is a process by which, where we have a number of statements concerning several quantities, we can obtain a separate statement concerning each. Thus, in algebra, elimination is the operation which consists in getting rid of a quantity or letter which is common, say, to two equations, by forming out of the two a new equation, in such a way as to make the quantity in question disappear. If three unknown quantities, for instance, are to be found from three independent equations, the first step is to form out of the three given equations two new equations, so as to eliminate one of the unknown quantities; from these two equations another of the quantities is eliminated in the same way, giving one equation with one unknown quantity, the value of which is then found. In complicated equations, elimination becomes difficult, and often impossible. Elimination is an important process in other sorts of reasoning besides the mathematical; in this larger acceptation, it means the setting aside of all extraneous considerations—of everything not essential to the result. In astronomical observations, the elimination of errors of observation is often effected by repeating the observations several times in such a way as to cause the errors to be of opposites kinds, then adding the observed values, and taking their average.—The word to “eliminate” is often erroneously used in the sense of to “elicit,” or bring to light.

ELIOT, CHARLES WILLIAM, LL.D., b. Boston, 1834; a graduate of Harvard, and tutor of mathematics in that institution. In 1858, he became interested in chemistry, and went to Europe to study that branch of science. In 1865, he was appointed professor of chemistry and metallurgy in the Massachusetts institute of technology; in 1869, he succeeded Thomas Hill as president of Harvard university. His father, **SAMUEL ATKINS ELIOT**, was the author of a history of Harvard, and for nearly a dozen years treasurer of the college. Dr. E. has led in the introduction of extensive changes in the course of study and the administration of his college, tending towards the style of the European universities.

ELIOT, GEORGE. See **EVANS, MARIAN.**

ELIOT, JARED, 1685–1763 ; b Conn.; grandson of the “apostle to the Indians,” preacher, agriculturist, and botanist; also eminent as a physician. He brought the white mulberry-tree to Connecticut. Among his works were *Agricultural Essays*, and *Religion Supported by Reason and Revelation*.

ELIOT, Sir JOHN, 1592–1632 ; an English statesman, b. at his father's seat on the river Tamar. He graduated at Oxford, studied law, and traveled on the continent, for part of the time with George Villiers, afterwards duke of Buckingham. At the age of 22, he entered parliament, and at 27, was made vice-admiral of Devon, in which office he captured the famous Nutt, a pirate whose depredations were a constant affliction upon the commerce on the southern coast. But by corrupt influences at court, Nutt was released to continue his depredations, while E. was imprisoned, on false charges, in the Marshalsea for about four months. Immediately upon his release, in 1624, he was returned to parliament, where, during the first three parliaments of Charles I., with Pym, Hampden, Selden, and Coke, E. was the foremost leader in resistance to the encroachments of the crown, surpassing all the great statesmen of his time in his symmetrical union of learning, genius, and lofty devotion, with absolute personal bravery and the fire of oratory. He spoke out boldly against the lawlessness and venality of the ministry, and the weak, ill-tempered foreign policy of Buckingham, and urged parliament to withhold supplies until an account was given of the money already voted. For comparing Buckingham to Sejanus, he was imprisoned in the Tower in 1626; but the commons compelled his release, and exonerated him by special vote. He suffered another short imprisonment for petitioning the king against forced loans, and later received sentence of outlawry. These persecutions only increased his popularity, and though earnestly opposed by the court, he was again returned to parliament in 1628. He took part in drawing up the petition of right, and, on the last day of that parliament, read a protest against tonnage and poundage and other taxes unauthorized by parliament; and against the king's illegal encouragement of Arminians and Roman Catholics. Being summoned before the council, with Holles, Selden, Valentine, and others, he refused to answer for his acts in parliament except to parliament itself. He was then rigorously confined in the Tower, with his fellow-members, for more than two months, until manifestations of popular indignation compelled the king to bring him to trial. During tedious delays his confinement was somewhat softened; he occupied himself in writing a personal defense, and other works; and in Feb., 1631, sentence was at last given. All the prisoners were condemned to a fine, the largest, of £2,000, being imposed upon E.; to imprisonment during the king's pleasure; and not to be released until they had given security for good behavior, submitted to the king, and acknowledged their offenses. The confinement of the others was gradually relaxed, until they were all released, but E. would make no submission. Dec. 21, 1631, more than a year after his arrest, the council resolved to force him to submission. They removed him to a cold, unwholesome room, and forbade any one except his sons to visit him. His health broke down, and with medical advice he petitioned the king, in simple, manly words, for such release as health demanded. His petition was refused as not sufficiently humble. In a second petition he declared himself “heartily sorry that he had displeased his majesty,” but added no words acknowledging wrong. He was denied an answer. He

had now been prisoner two years, and though only forty years old, was worn out with cruel confinement. He died two weeks after the king refused his last petition. Charles even refused permission to his sons to bury him in the family tomb, and ordered that he should be buried in the church of the parish where he died. During the commonwealth his sentence of conviction was reversed by act of parliament.

ELIOT, JOHN, 1604-90; "the apostle of the Indians;" b. at Nasing, Essex, Eng. He graduated at Cambridge in 1623, and entering the non-conformist ministry, emigrated in 1631 to Boston, Mass., where he officiated for a year in the church of Mr. Wilson, who was then in England, and, in 1632, he was settled over the church in Roxbury. He soon began preaching to the Indians, acquiring their language by the help of a young Pequot, taken prisoner in 1637. He translated the commandments, the Lord's prayer, and many texts, and first preached without an interpreter in 1646, at Nonantum, now Brighton, on the border of Newton. A settlement of Christian Indians was established, and a missionary society was organized in England, of which Robert Boyle was a leading member. This society sent Eliot £50 per annum to supplement his salary of £60 at Roxbury. In 1651, the settlement was removed to Natick, where an Indian church was formed in 1660. In 1653, E. published a catechism for their use, said to have been the first work published in the Indian language; no copy is known to exist. In the same year accounts of Eliot's labors were published by the corporation in London, and in 1655, a tract containing the doctrinal and experimental confession of these Indians who had been baptized and admitted to church fellowship. In 1660, E. published in London *The Christian Commonwealth, or the Civil Policy of the rising Kingdom of Jesus Christ*, which was criticised as containing seditious principles. The governor and council of Massachusetts required him to retract some of its utterances. About this time he completed his great work, the translation of the Bible into the Indian tongue. The New Testament was published at Cambridge, Mass., in 1661, the Old in 1663. A second edition of the New Testament was printed in 1680, and of the Old in 1685. Both of these editions are now very rare; the language in which it was written has ceased to be spoken, and only one or two persons in recent times are able to read it. E. was assisted in the translation by the Rev. John Cotton, of Plymouth, Mass. A new edition was printed at Boston, 1822. E. published many other works in the Indian and in the English tongue. His well-known *Indian Grammar Begun*, printed at Cambridge, Mass., 1666 (reprinted 1822), has at the end these memorable words: "Prayers and pains, through faith in Jesus Christ, will do anything." Of his *Indian Primer* (1669), the only complete copy known to exist is preserved in the library of the university of Edinburgh. It was reprinted, 1877. In 1671, E. printed in English, at Cambridge, *Indian Dialogues, etc.*; and in 1672, *The Logick Primer*. Of the former the only known copy is in a private library in New York; of the latter work there is a copy in the British museum, and another in the Bodleian library. Even in his old age the pen of E. was not idle. He died at Roxbury, Mass., at the age of 86, having won all hearts by his simplicity of life and manners, and his evangelical sweetness of temper, whether in the villages of the English colonists, or in the huts and wigwams of the Indians. His Indian publications are still of value for the light which they throw upon the structure and character of unwritten dialects.

ELIOT, SAMUEL, LL.D., b. Boston, 1821; graduated at Harvard, and traveled in Europe four years. He became professor of history and political science in Trinity college, Hartford, in 1856, and was president from 1860 to 1866; and in 1874, professor of political science and constitutional law in the same institution. He has published *Passages from the History of Liberty*, 1847, in which he traced the careers of Savonarola and other reformers, a work afterwards enlarged under the title *The Liberty of Rome*, 1849, and republished, with additional volumes, as *The History of Liberty*, 1853. He also published a *Manual of United States History*, 1856.

ELLIOTT, OR ELIOT, GEORGE AUGUSTUS. See **HEATHFIELD, LORD**.

ELIS, one of the ancient divisions of the Peloponnesus, bounded n. and n.e. by Achaia, e. and s. by Arcadia, and w. by the Ionian sea. It was originally divided into three districts—Cœle or Hollow Elis, Pisatis, and Triphylia. Of these, the first-named was by far the largest and most valuable, comprising as it did the broad and fertile plains watered by the Peneus and the Ladon, and producing excellent crops of corn, cotton, and flax; while the pastures by the river-banks reared cattle and horses of proverbial excellence. This district, from its fertility, was called "the milk-cow of the Morea." Pisatis is drained by the Alpheus, and is separated from Cœle Elis by Mt. Pholoë, a spur of Erymanthus. The low grounds of this division possess great natural fertility. Most of the surface of Triphylia is hilly, being occupied with offshoots from the great Arcadian ranges. It is separated from Pisatis by the Alpheus, on whose banks were the grove and temple of Olympic Jove, and the plain in which the great Olympic games were celebrated. Though E. had few facilities for preventing invasion, it yet suffered less from war than any other of the Greek states—an advantage chiefly due to the sacred character of the country, as the seat of the greatest of the national festivals. Their prerogative of holding the Olympic games gave the Eleans a prestige which they continued to enjoy in greater or less degree till the games themselves were suppressed by the emperor Theodosius in 394 A.D.—**ELIS**, now *Kaloskopi*, the capital of the fore-

going country, stood on the Peneus, and was long famous as one of the most splendid and populous cities of Greece. It was at one time strongly fortified, and contained many magnificent buildings, conspicuous among which was the gymnasium, in which it was necessary that all athletes intending to take part in the Olympic games should go through a month's training before they were allowed to compete. See Leake's *Morea*, and Curtius' *Peloponnesus*.

ELISHA, a prophet of Israel, the successor of Elijah, who found him at the plow, and consecrated him to the sacred office by throwing his mantle over his shoulders. He exercised his functions for a period of 55 years. When Elijah was carried up into heaven, E. returned to Jericho, where he dwelt for some time. He then proceeded to Bethel, where the perplexing miracle occurred of the destruction of the 42 children by the two she-bears. After this period, he seems, besides performing an extraordinary number of miracles, to have taken an active part in the religious politics of his country, but he exhibited nothing of the fiery and sanguinary zeal of his master. Mild, tolerant, conciliatory, we hardly ever, if at all, find him rebuking the Baal-worship that was still prevalent in Israel. Many of the incidents in his history recall the creations of eastern fancy, such, for example, as those of the horses and chariots of fire round about E. on the hillside, of the smiting of the Syrian host with blindness, so that the prophet led them all unconsciously into Samaria, captive, etc. With Elijah, it has been said (see Smith's *Dictionary of the Bible*: art. "Elisha"), the miracles are "introduced as means towards great ends, and are kept in the most complete subordination thereto. But with E., as he is pictured in the Hebrew narrative, the case is completely reversed; with him, the miracles are everything, the prophet's work nothing. The man who was for years the intimate companion of Elijah, on whom Elijah's mantle descended, and who was gifted with a double portion of his spirit, appears in the Old Testament chiefly as a worker of prodigies, a predictor of future events, a revealer of secrets, and things happening out of sight or at a distance." The difficulties that thus beset the literal acceptance of the narrative of E.'s miracles have been felt by most modern commentators, and to evade these difficulties various methods, more or less satisfactory, have been employed. For several years E. was the chief theocratical counselor of Jehoram. Under the reign of Jehu and his successors, he gradually withdrew from public affairs, and died in Samaria in the reign of Jehoash, grandson of Jehu (about 840 B.C.). It has been customary to draw a parallel between E. and Christ; and his mildness and gentleness—always excepting the story of the destruction of the children at Bethel, which has perplexed all humane readers of Scripture—seem to justify this. E. is canonized in the Greek church; his day is the 14th of June.

ELIXIR (Lat. *elicare*, to extract by boiling), a term in pharmacy, which has come down from the days of alchemy, and is applied to various preparations, consisting mostly of solutions of aromatic and bitter vegetable substances in spirits of wine. The term tincture is now more common. **ELIXIR OF VITRIOL**, or aromatic sulphuric acid, is prepared from $1\frac{1}{2}$ fluid ozs. of sulphuric acid (oil of vitriol), 10 fluid ozs. of rectified spirit, $\frac{1}{4}$ oz. cinnamon in powder, 1 oz. ginger in powder. The acid is gradually added to the spirit, and the mixture being placed in a closed vessel, is allowed to digest at a gentle heat for three days; the cinnamon and ginger are then added, and after being allowed to stand about six days, the whole is strained through cloth. The elixir of vitriol is useful for quenching thirst, sharpening the appetite, checking profuse perspiration, and often reducing the action of the pulse. The dose may range from 10 to 40 minims, and is administered in a wine-glassful of water, or some mild liquid, as infusion or conserve of roses.—**ELIXIR VITÆ OF MATHIOLUS** is composed of alcohol, and upwards of twenty aromatic and stimulating substances, and was at one time administered to patients suffering from epilepsy.

ELIZABETGRAD, a t. of South Russia, is situated in the midst of a delightful plain, on the banks of the Ingul and the Balta-Kremenchug railway, in lat. $48^{\circ} 27' N.$, long. $32^{\circ} 15' E.$, about 152 m. n. from Kherson. It consists of a town proper and four suburbs, is well built, its streets straight, wide, and adorned with avenues of trees. E. has a large arsenal within the walls. A considerable trade is carried on here in the produce of the surrounding districts and in leather goods. Manufactured goods are imported largely from Odessa. Great numbers of cavalry are always present in E., as it is the head-quarters of the military colonies e. of the river Bug. Pop. '92, 59,770.

ELIZABETH, a city and co. seat of Union co., N. J.; on Newark bay and Staten Island sound, 12 m. s.w. of New York, on slightly elevated ground on both sides of the Elizabeth river; reached by the New Jersey Central, the Pennsylvania, the Baltimore and Ohio, and the Philadelphia and Reading railroads. It was settled under the name of Elizabethtown in 1665, and was the capital of N. J. from 1755 to 1757. It is well laid out with broad and well-graded streets, and contains several small parks and many handsome residences. It is the home of a large number of men who do business in New York. The port is accessible for vessels of 300 tons, and receives large quantities of coal and iron brought by rail from the Pennsylvania mines for transshipment. A line

of steamboats plies daily between Elizabethport and New York; water is supplied from driven wells and the Elizabeth river; the streets are lighted with gas and electricity and paved. The property of the city was assessed in 1896 at over \$16,500,000. Among the public institutions are a general hospital, orphan asylum, home for aged women, Alexian Brothers hospital, public library, and several theatres. There are two collegiate schools for young women, a business college, several public and private schools, numerous churches, and daily and weekly newspapers. The principal manufactures are of sewing-machines, pottery, stoves and furnaces, engines, carpets, steam radiators, fertilizers, jewelry, chemicals, and ships. There are also several foundries, breweries, and tanneries. There are national and savings banks, several insurance companies and building loan associations and electric lights and street railroads. Among the points of special interest are the old tavern where Washington stopped when on his way to New York to be inaugurated president; Gen. Winfield Scott's house; the Boudinot house; and the old Livingston mansion. Pop. 1890, 37,764.

ELIZABETH, Queen of England, was the daughter of Henry VIII. and the unfortunate Anne Boleyn, and was b. 7th Sept., 1533. While she was yet in her third year, her mother was beheaded. After her mother's execution, she was sent to the country, where, in comparative poverty and seclusion, under the care of ladies who leaned to the "new learning," and sometimes, though seldom, with the companionship of her brother Edward, or her sister Mary, the greater part of her early youth was spent. When Catharine Parr became queen, E., who was a favorite with her, was more seen at court; but from some unknown cause, she incurred her father's displeasure, and was again sent to the country. Her father died when she was 13 years old. During the reign of her brother Edward, her life passed quietly and peacefully. She was then remarkable for a great demureness and sobriety of manner, discoursing with her elders with all the gravity of advanced years. Edward used to speak of her as his "sweet sister Temperance." During her sister's reign, this demureness was exaggerated into prudery, and the vanity which, in after years, with ampler means at its command, displayed itself in the utmost profusion of personal decoration, then sought for distinction by excess of plainness. Her Protestantism, and the way in which court was paid to her by the Protestant nobility, caused uneasiness to Mary and her council. On her sister's command, she conformed to papacy, but the insincerity of the conformity imposed upon no one. Upon the pretext of having been concerned in Wyatt's rebellion, she was sent in 1554 to the Tower. She entered it with all the gloomy forebodings which the fate of so many royal ladies who had been recently within its walls, could suggest. In daily fear for her life, many months passed. Indeed, the warrant for her execution was at one time prepared; and it is unquestionable that the stern bigotry of Mary and her counselors, Gardiner and Bonner, would have sacrificed E., but for the fear of popular commotion. The people, however, regarded E. with great favor, and many already looked forward to the time when the death of Mary should free the court from foreign influence, and give room for a milder government. Thus the life of E. was saved, but for some time longer she was kept a prisoner at Woodstock. During the remainder of Mary's reign, E., though occasionally at court, resided chiefly at her residence of Hatfield house, in Hertfordshire, where she occupied herself with feminine amusements, and the study of classical literature, under the learned Roger Ascham.

When Mary died (17th Nov., 1558), E. was 25 years of age. Her accession was welcomed alike by Catholic and Protestant. The former were, outwardly at least, the majority in Mary's reign; but among them were few who really cared for the peculiar doctrines of the Roman church, and there were many who were weary of priestly interference, foreign dictation, and cruel persecution. Like E. herself, there were many who had conformed merely to save themselves from trouble. They had obeyed the Six Articles in Henry's time; had agreed to the Protestant settlement of Edward; had turned with queen Mary, and were now ready to turn again with queen Elizabeth. The Protestants, of course, who had never believed the sincerity of E.'s conformity, welcomed her to the throne. E. then began, amidst dangers and difficulties, a reign which, contrary to the expectation of all, was of unexampled length and prosperity. It would be wrong not to attribute to her influence some effect in producing the great changes which, during the next 44 years, took place in England; but so far as these changes were not produced in the natural course of the development of the nation's powers, and so far as they bear the mark of an individual mind, they bear much more the impress of the bold yet cautious judgment and clear intellect of the great minister, Cecil, than of the sovereign's will. It is to the highest praise of E. that her first act on succeeding was to consult with such a man, and that to the very last she could bend her capricious temper to his control.

How the government influence was to be directed, was not long in being shown. Till parliament should meet, E. issued a proclamation that the English language should be used in the greater part of the church service, and that the host should not be elevated by the priest during mass. This sufficiently indicated into what hands power

had passed, and was enough to throw the mass of the indifferent to the side of the Protestants, and to cause a Protestant majority to be returned to E.'s first parliament. The acts of this parliament must be ever memorable in our history. It was then that England took its position as a Protestant power. The Book of Common Prayer, retaining, doubtless, some mixture of mediæval thought, but still vivid with new energy, was appointed to be used in all churches; the Thirty-nine Articles were settled as the national faith; the queen was declared to be head of the church. Thus all allegiance to Rome was thrown off. This revolution was soon accomplished and with little turmoil. The bishops, with one exception, refused to conform; but as a sign of the times, marking how thoroughly the priesthood must have become demoralized before their power was lost, it is noteworthy that of the 9,000 clergymen who held livings in England, there were fewer than 200 who resigned, rather than obey the new order of things.

The policy of E.'s ministers was one of peace and economy. They found the nation at war with France and Scotland, and one of their first acts was to secure peace upon favorable terms. Ever afterwards, they followed the same path. No war was undertaken in her reign for the sake of territorial conquest. To strengthen her own throne, E. secretly succored the Protestants in Scotland, in France, and in the Low Countries; but she had few open wars. To be at peace with a government, nay, apparently to be upon the most amicable terms with it (as E. was with the French court, while she sent assistance to the Huguenots at Rochelle), and at the same time to aid its rebellious subjects, was in those days thought only part of the politic dissimulation, without which, it was believed, no nation could be safely ruled. To maintain the security of her own throne, and to prevent foreign interference in English matters, was the mainspring of E.'s foreign policy; and she lost no opportunity of weakening and finding occupation abroad for any foreign power that unduly threatened her authority.

The one great blunder of England's policy was the treatment of Mary Queen of Scots. Had E. pursued a straightforward course, when her rival was thrown into her hands, much evil might have been spared. Some of the English ministers were prepared to take effectual measures to remove a life which might be turned into so dangerous a tool in the hands of Catholics. E. shrank from that course, but had not the courage and generosity to set queen Mary at liberty. Had this course been taken, Mary would have gone to France or Spain, would have made a foreign marriage, and as a foreigner would have lost the only sources of her real power—the sympathies of the Scotch and English Catholics. As it was, E. retained her a prisoner, and thus for years gave cause to conspiracy after conspiracy among the English Catholics. For a rebellion incited to set Mary free, the richest and most popular of the English nobility, Norfolk, was executed. The discovery of every new plot led to demands, on the part of parliament, for the execution of Mary. The plots then took a graver aspect. The assassination of E., and the placing of Mary on her throne, became the object. On the discovery of Babington's conspiracy for this purpose, the popular cry was irresistible, and was joined in by Cecil and Walsingham, and others of E.'s ministers, who had sinned too deeply against Mary to run the risk of her succession to the throne. With reluctance and hesitation, the sincerity of which need not be questioned, E. consented; and Mary, after long years of confinement, was condemned and executed.

This led to new evils. The participation of the Catholic party in the plots was retaliated by persecution. Many suffered under an act passed in 1585, making it treason for a Catholic priest to be in England, and felony to harbor one. These cruel measures were the ultimate means of bringing upon England the most menacing foreign attack which she had suffered. Philip of Spain had long meditated vengeance against England. The greatest state in Europe, enriched by splendid acquisitions in the new world, could ill brook that a power of the second rank should incite rebellion among her subjects in the Netherlands, should aid the Protestants in their desperate struggle against Alva, and allow its ships (little better than pirates, it must be confessed) to enter the Spanish harbors, and cut out the rich laden galleons. These were the real reasons: to restore the Catholic faith, and to revenge the death of a Catholic queen, furnished ostensible reasons. Years had been spent in preparation. In 1588, the "invincible armada" sailed from the Tagus, manned by 8,000 sailors, and carrying 20,000 soldiers. To aid these, a land-army of 100,000 men was to be transported from the Netherlands under the duke of Parma. The news roused all England, and every man who could carry arms—Protestant and Catholic from 18 years of age to 60—was enrolled in the forces. The old queen herself rode at Tilbury, energetically encouraging the army. A fleet of 200 vessels and 15,000 seamen gathered itself on the southern coasts, and waited the attack. Superior skill and courage gained the victory for the English; and what these had begun, the force of the elements completed. The splendid armada was broken and destroyed before it could join the land-army, not a soldier of which ever left foreign ground; while not a seaman of the fleet, save those whom shipwrecks sent, ever set foot on English ground.

E. died on 24th Mar., 1603, having lived nearly 70, and reigned nearly 45 years. If the life of her rival, Mary of Scotland, read somewhat like a tragedy, the private life of E. might afford abundant materials for comedy. Always parading her wish to live an unmarried life, E. coquetted with suitor after suitor till long after that period of life

when such proposals verge upon the ridiculous. Of her father's schemes to marry her to the Scotch earl of Arran or to Philip the son of Charles V.—afterwards husband of Mary—it is unnecessary to speak, for E. had personally little to say in regard to them. But she was scarcely more than a child when her flirtations with the handsome lord admiral Seymour—the brother of the protector Somerset—had passed the bounds of decorum. In Mary's reign, E. was flattered with the attentions of her kinsman, the earl of Courtenay, and she declined the hand of Philibert of Savoy, pressed on her by her sister's council. When queen, with some hesitation she refused the offer of Philip II., who was desirous of perpetuating his influence over England, and she began that connection with Leicester, which so seriously compromised her character. It is certain that she loaded him with honors as soon as she had them to bestow; allowed him to become a suitor for her hand within a few days after the sudden death of his wife, Amy Robsart, attributed by all England to his agency; and allowed him to remain a suitor long after his open profligacy had disgusted the nation, and had even opened her own eyes to his worthlessness. If we credit the scandal of the times, the intimacy was of the most discreditable kind. If we credit those sources of information, recently turned to more profit by Mr. Froude than by any of his predecessors, which are found in the dispatches of the bishop of Aquila, ambassador of Philip II. in London, preserved in the archives of Simancas, not only was the moral character of E. sullied with the darkest crimes, but even the quality for which she has ever been most honored, her English patriotism, was mere affectation. These dispatches represent her as accessory—at least, after the fact—to the murder of Amy Robsart, and as offering to Spain to become a Catholic, and to restore the Spanish ascendancy in England, if Philip would support her on the throne as the wife of Leicester; and they represent her as being restrained from giving way to the fatal consequences of her wild passion only by Cecil's control. That there is some basis of truth in this revelation, it is scarcely possible to deny; but the hatred with which Philip regarded E., after her refusal to marry him, has undoubtedly led the courtly bishop to gross exaggerations. It is undeniable, however, that had E. followed her own inclinations, she would have married Leicester. Her ministers, wisely for the nation, prevented this, but E. never seriously entertained another proposal. Cecil could prevent her marrying whom he would not, but he could not force her to marry whom he would. Among less distinguished suitors, the archduke Charles of Vienna, and prince Eric of Sweden, pressed their suit in vain. Petitions from parliament to the queen to marry, only excited her maidenly wrath, and produced dignified replies that she would attend to the matter when the time came. Years passed on, and she remained a spinster. Catharine of Medici, queen-mother of France, intrigued to marry her to one of her sons, Henry of Anjou (afterwards Henry III.), or the duke of Alençon, afterwards duke of Anjou. When the foreign envoys pressed the suit of the latter, E. was 38 years of age, and her suitor 19; but they ingeniously flattered her that she and he looked of the same age, for she, by her good preservation, looked nine years younger than she was; while the duke, by his wisdom, gravity, and mature intellect, looked nine years older. This flattery, with more plausible attractions, was without effect.

E.'s position gave too much scope for the development of the unamiable and ridiculous features of her character. The personal vanity displayed in her extravagant dress, her conversation, her "high and disposed" dancing, excites a smile, not lessened when we read of the irritable mistress boxing the ears of her councilors, cuffing her attendants, indulging in expressive masculine oaths, and amusing herself with rough masculine sports. The assertion that she was of a cruel disposition is false. That she could do cruel things when her vanity was concerned is sufficiently attested by her ordering the right hand of a barrister, named Stubbes, to be struck off for writing a remonstrance against her marriage with the duke of Alençon, which she thought unduly reflected on herself; but in her reign, the reckless waste of human life which marked the reigns of her predecessors was unknown. She was not, however, of fine feelings. Her brother could compliment her on the calm mind and elegant sentences with which she replied to the communication of the death of her father. On the news of her sister's death, she burst out with rhapsodical quotations from the Psalms; and when she heard of the execution of her lover Seymour, she turned away the subject with something like a jest. By her attendants, she was more feared than loved. The one quality which never failed her, was personal courage; and when she chose, her demeanor was stately and royal. Religion was with her, as with a great proportion of the nation at that time, a matter more of policy and convenience than of feeling or principle. She preferred Protestantism, from early associations, because it gave her the headship of the church, freed her from foreign interference, and was more acceptable to her ministers and to the nation. But she had conformed in Mary's time to Catholicism with little difficulty; and, had there been necessity for it, she would rather have reigned a Catholic than not have reigned at all. To the last, she retained in her private chapel much of the ritualism of the Roman church; and while refusing her Catholic subjects the exercise of their religion, she entertained the addresses of Catholic suitors. How thoroughly incapable she was of appreciating a matter of religious principle may be gathered from the fact, that she looked upon the great Puritan movement, destined soon afterwards to play so impor-

tant a part in the nation's development, as some frivolous controversy about the shape of clerical vestments. Of toleration, then well enough understood by Bacon and the more advanced spirits of the age, she had no conception.

What makes the name of E. so famous, was the splendor of her times. In her long reign, the true greatness of England began. Freed from the possession of those French provinces which rather harassed than enriched—with little domestic commotion—with no great foreign wars—with an almost complete immunity from religious persecution, the nation turned to the arts of peace. An unequaled literature arose. The age that produced Spenser, Shakespeare, and Bacon could not be other than famous. Under Frobisher and Drake, maritime adventure began, and the foundations of our naval force were laid. Commerce, from being a small matter in the hands of a few foreign merchants, developed itself largely. The exchange of London was opened in E.'s time; and in the charter which she granted to that company of merchant adventurers, which afterwards took the name of the East India company, may be seen one of the small beginnings of our vast colonial empire. The social condition of the people also greatly improved in her reign. The crowds of vagabonds which the monastic institutions had fostered, and who had pillaged the country in all ways on the secularization of the monastic property, died out, or were absorbed in industrious employments. The last traces of bondage disappeared. Simultaneously with the growth of greater comfort and intelligence in the people, parliament began to assert, with greater vigor, its constitutional rights. The right of the commons to free speech, and to initiate all money-bills, was steadily asserted, and the right of the crown to grant monopolies, or to issue proclamations having the force of law, vigorously assailed. In the later years of her reign, the attempts of E. to gain arbitrary power, and her caprices, had forfeited the popularity which she so anxiously cultivated. But after her death, her fame revived; and during the time of the Stuarts, amid the jealousy of the Scotch, the troubles of the civil wars, and the hatred of a Catholic sovereign, the nation looked back with fond regard to the long reign of the "Good Queen Bess," when peace had prevailed, and the government had been thoroughly English. See Church, *Elizabeth* (1889).

ELIZABETH, QUEEN OF ROUMANIA; b. 1843, a princess of Wied Neuwied, and married to King (then Prince) Charles of Roumania in 1869. Under the name of *CARMEN SYLVA*, she has written a number of books in verse and prose, among them *Stürme Leiden's Erdgang*, tr. into English by Helen Zimmern as *Pilgrim Sorrow*; *Jehovah*; *Pensées d'une Reine*, etc. In 1890 she visited England and Wales.

ELIZABETH, SAINT, daughter of Andreas II., king of Hungary, was b. at Presburg in 1207. At the age of four, she was affianced to the landgraf of Thuringia, Louis IV., called the pious, and brought to his court to be educated under the eyes of the parents of her future husband. She early displayed what may be called a passion for the severities of the Christian life, as it was conceived in those days. She despised pomp, avarice, ambition; cultivated humility, and exhibited the most self-denying benevolence. Her conduct, even as a girl, astonished the Thuringian court; but such was the grace and sweetness of her disposition, and the excellence of her beauty, that Louis—though her affections seemed to be given wholly to God—still wished to marry her. They were united when E. was only 14. Louis himself, far from blaming the devout girl whom he had made his wife for her long prayers and ceaseless almsgiving, was himself partially attracted to a similar mode of life. A boy and two girls were the fruit of their union; but the happiness of E., in so far as it depended on anything earthly, was shattered by the death of her husband in 1227, when absent on the crusade headed by Barbarossa. Her confessor, Conrad of Marburg, a narrow fanatical monk (to whose miserable teaching E. mainly owed her perverted idea of life and duty), had trained her to stifle the emotions of her nature as sinful, and the poor widow hardly dared to bewail her loss. Great misfortunes soon befell her. She was deprived of her regency by the brother of her deceased husband, and driven out of her dominions on the plea that she wasted the treasures of the state by her charities. The inhabitants of Marburg, whose miseries she had frequently relieved, refused her an asylum, for fear of the new regent. At last she found refuge in a church, where her first duty was to thank God that he had judged her worthy to suffer. Subsequently, after other severe privations, such as being forced to take up her abode in the stable of a hostelry, she was received into the monastery of Kitzingen by the abbess, who was her aunt. When the warriors who had attended her husband in the crusade returned from the east, she gathered them round her, and recounted her sufferings. Steps were taken to restore to the unfortunate princess her sovereign rights. She declined the regency, however, and would only accept the revenues which accrued to her as landgravine. The remainder of her days were devoted to incessant devotions, almsgivings, mortifications, etc. There is something mournfully sublime in her unnatural self-sacrifice. We shudder even in our sympathy when we read of this beautiful tender-hearted creature washing the head and the feet of the scrofulous and the leprous. Murillo has a painting (now in the museum at Madrid) of this act of evangelical devotion. The solemn tragedy of her brief life assumed towards its close a ghastly intensity through the conduct of her confessor, Conrad, who, under pretense of spiritual chastisement, used to strike and maltreat her with brutal severity. The alleged cause of this was Conrad's aversion to her "squandering" her money among the poor. Perhaps he thought it should have gone

to him. At last her health gave way; and on the 19th Nov., 1231, at the age of 24, E. died, the victim partly of ill-usage and partly of a mistaken theory of religious life, but as gentle and saintly a soul as figures in the history of the middle ages. She was canonized four years after her death. See Montalembert's *Histoire de Sainte Elisabeth de Hongrie* (Paris, 1836). The Rev. Charles Kingsley's dramatic poem, entitled *The Saint's Tragedy* (London, 1848), is founded on the story of E.'s life.

ELIZABETHAN ARCHITECTURE, a term applied to the mixed style which sprang up on the decline of Gothic architecture. By some it is called the Tudor style, but that name belongs more correctly to the perpendicular, or latest kind of Gothic. The Elizabethan is chiefly exemplified by mansions erected for the nobility in the reigns of Elizabeth and James I., and originated in the first attempt to revive classic architecture, influenced, no doubt, by Holbein, who was patronized by Henry VIII., and furnished several designs in this manner. John of Padua succeeded him, and built in the mixed style a palace for the protector Somerset (for which purpose the cloisters of St. Paul's were taken down), and the mansion of Longleat for his secretary, sir John Thynne. The vast dimensions of the apartments, the extreme length of the galleries, and enormous square windows, are the leading characteristics of this manner of building. The ornaments both within and without were cumbersome; nothing could exceed the heaviness of the cornices and ceilings wrought into compartments; in short, the architecture was just in keeping with the dress of the period, rich and gorgeous, rather than elegant, graceful, and comfortable. The following examples of mansions of the 17th c. may be still seen near London: Holland house, Campden house; and the following in Kent: Sir T. Willow's at Charlton, the marquis of Salisbury's at Hatfield, and Knowle, the property of the duke of Dorset. The most eminent architects of those times were John Thorpe, Gerard Christmas, Rodolph Symonds, and Thomas Holt.

ELIZABETH CITY, a co. in s.e. Virginia, on James river and Chesapeake bay; 50 sq.m.; pop. '90, 16,168, incl. colored. Corn and wheat are the staple products. Co. seat, Hampton.

ELIZABETH ISLANDS, a group s.w. of cape Cod, between Buzzard's bay and Vineyard sound, forming the town of Gosnold, Dukes co., Mass. There are 16 islands, the most important of which are Naushon, Cuttyhunk, Pasque, and Nashawena; pop. of the whole group (permanent residents) about 100. The islands have a fine climate, and afford excellent fishing. On Cuttyhunk island the foundations of the first English colony of New England were laid, in 1602, by Bartholomew Gosnold, but the place was abandoned a few weeks later. On another island, Penikese (area 100 acres), a school of natural history, connected with Harvard college, was established 1873, but discontinued in a few years.

ELIZABETH PETROVNA, empress of Russia, daughter of Peter the Great and Catherine I., was b. in the year 1709. On the death of Peter II., in 1730, she allowed Anna, duchess of Courland, to ascend the throne, she herself being apparently indifferent to anything but the indulgence of her passions. Anna died in 1740, and Ivan, the son of her niece (also called Anna), an infant of two months, was declared emperor, and his mother regent during his minority. Shortly after this, a plot was formed to place E. upon the throne; the two principal agents in it were Lestocq, a surgeon, and the marquis de la Chetardie, the French ambassador. The officers of the army were soon won over; and on the night of the 5th Dec., 1741, the regent and her husband were taken into custody, and the child Ivan conveyed to Schlüsselburg. The leading adherents of Anna were condemned to death, but pardoned on the scaffold, and exiled to Siberia. By eight o'clock in the morning, the revolution was completed, and in the afternoon all the troops did homage to the new empress. La Chetardie was handsomely rewarded; and Lestocq was created first physician to the empress, president of the college of medicine, and privy counselor. E., however, did not possess the qualities requisite in a ruler. She wanted energy, knowledge, and love of business, and allowed herself to be guided by favorites. In order to strengthen her position, E. took pains to win over her nephew, the young prince Peter, the son of her sister, the duchess of Holstein-Gottorp. She summoned him to Petersburg in the year 1742, and proclaimed him her successor. E. took part in the Austrian war of succession, and in spite of the opposition of France, dispatched an army of 37,000 men to the assistance of Maria Theresa, and thereby hastened the conclusion of the peace of Aix-la-Chapelle in 1748. E. showed herself less placable towards Frederick II., against whom she cherished a personal enmity, excited by some severe expressions he had employed respecting her. At the commencement of the seven years' war, she allied herself with Austria and France, and marched her troops into the Prussian states. Her troops gained the victory in the battles of Grossjägerndorf and Kunersdorf, and took possession of Berlin, but without any decisive result. E. died before the expiration of the war, 5th Jan., 1762. She founded the university of Moscow and the academy of art at St. Petersburg. Though no person was put to death during her reign, the most shocking punishments were inflicted, and thousands were exiled to Siberia and Kamtchatka. E. had several illegitimate children. Profligacy, espionage, and persecution reigned in her court, the administration of justice was restrained, and the finances neglected; but E. was nevertheless extremely strict in the observance of the public ordinances of religion.

ELIZABETH STUART, queen of Bohemia, remarkable not only as a heroine, but as forming the connecting link between the ancient royal families of England and Scotland and the present reigning dynasty, was b. in the palace of Falkland (q.v.) on the 19th of Aug., 1596. On the accession of her father, James VI. of Scotland, to the crown which fell to him by the demise of queen Elizabeth, in 1603, she accompanied the family to England, where she was educated. On the 14th of Feb., 1613, E. was married to Frederick, elector-palatine, whom she soon after accompanied to his residence, the castle of Heidelberg (q.v.); see also **PALATINATE**. When the Protestant princes of Germany sought for a fitting person to fill the throne of Bohemia, they made choice of Frederick, who accepted the perilous honor, partly, perhaps, from the ambition of his wife, who is alleged to have longed for the title of queen. The palatine removed with E. and three children to Prague, which they entered Oct. 21, 1619. Frederick and E. occupied the throne of Bohemia only about a year. By the forces of the Catholic league, the army of Frederick was routed at the battle of Prague, Nov. 8, 1620, and the royal family fled into exile, for already the palatinate was laid waste. With her husband and children, and a few faithful attendants, E. took up her residence at the Hague, and ever afterwards the family lived in a state of dependence. E. was the mother of 13 children, the eldest of whom was accidentally drowned in Holland, and 3 others died young. The next were Charles-Louis and Rupert, and, following in order, were Elizabeth, Maurice, Edward, Philip, Louisa, Henrietta-Maria, and Sophia. From this numerous offspring, E. derived little comfort in her misfortunes. Charles-Louis was a selfish, calculating person, with low, disreputable habits. Rupert (q.v.) the "mad cavalier," and his brother, Maurice, fought in England during the civil war, and, after the loss of the royalist cause at the battle of Naseby, they betook themselves to the sea, and for some time were little better than pirates. Edward, in 1645, abjured Protestantism, and was admitted into the Roman Catholic church. Philip committed an assassination at the Hague, fled from justice, became a soldier of fortune in France, and was slain in the civil wars. Elizabeth accepted the office of superior of the Lutheran abbey of Hervorden, Henrietta-Maria was espoused by Ragotzi, prince of Transylvania, but died shortly after her marriage. Louisa fled to France, and died as abbess of Maubisson. Previous to these events, E. became a widow by the death of Frederick, Feb. 17, 1629, when his right to the palatinate devolved on Charles-Louis, who, by the treaty of Westphalia, was restored to the family inheritance, Oct. 24, 1648. This favorable turn of affairs did not mend the fortunes of E., who was scandalously neglected by her son, the young elector-palatine; and all he would do for the family was to give a shelter to his youngest sister Sophia, until she was married to Ernest-Augustus, a scion of the house of Brunswick, who ultimately succeeded to the electorate of Hanover.

Deprived, in one way or other, of all her children, the queen of Bohemia—by which title she continued to be known—resolved to quit Holland. Relieved of her debts by the sale of jewels, and by aid of a pecuniary subsidy from the British parliament, she embraced an invitation from her nephew, Charles II., to come to England. She arrived May 17, 1661. From this time she was in a great measure indebted to the hospitality of lord Craven, in a mansion which he had purchased from sir Robert Drury, in Drury lane, London. Charles II. paid her little attention; but at her death, which occurred Feb. 13, 1662, he caused her remains to be interred in Westminster abbey. Charles-Louis, her son, died in 1680, leaving a son, who died without issue, and the palatinate then went to a distant branch of the family; he left also a daughter, Charlotte-Elizabeth, who, in 1671, had married Philip, duke of Orleans, only brother of Louis XIV. In 1674, she gave birth to a prince, who became the noted regent of France during the minority of Louis XV. She died at St. Cloud in 1722. The late Louis-Philippe, king of the French, was her lineal descendant. When, in 1708, the question of succession to the crown of Great Britain was debated, it was found that all the descendants of James I. were either dead or were Roman Catholics, except Sophia, electress of Hanover, and her family. By act of parliament, that year, the crown was accordingly secured to her and her descendants, "being Protestants;" and in virtue of this act of settlement, on the death of queen Anne, Sophia would have ascended the throne, but she predeceased the queen three months, and her son became sovereign of the realm as George I., Aug. 12, 1714. In this extraordinary and unforeseen manner did a grandson of the unfortunate queen of Bohemia become king of England, and originate the dynasty of the reigning monarch. The *Memoirs of Elizabeth Stuart, Queen of Bohemia*, by Miss Bengier, 2 vols., may be perused as an accurate and pleasing piece of biography.

ELIZABETO'POL, a government in Asiatic Russia bordering on Persia; 16,721 sq. m.; pop. 793,969. The principal city bears the same name.

ELIZABETO'POL, a t. of Russian Transcaucasia, is situated in lat. 40° 42' n., long. 46° 20' east. It was formerly an Armenian town, afterwards a Turkish fortress and in 1813 was annexed to Russia. Its principal buildings are its churches and mosques, of which there are many. The town is remarkable for its numerous fruit-gardens and vineyards. Pop. about 21,000.

ELK, a co. in s.e. Kansas; formed and organized, 1875; crossed by Elk river; surface nearly flat, soil fertile; 651 sq. m. Pop. '90, 12,216. Co. seat, Howard.

ELK, a co. in central n.w. Pennsylvania, on the head waters of Clarion river, intersected by the Buffalo, Rochester, and Pittsburg and the Pennsylvania railroads; 760 sq. m.; pop. '90, 22,239. The surface is rough; coal-mining and lumbering are the leading occupations. Co. seat, Ridgway.

ELK, IRISH, *Megaceros Hibernicus*, a large deer found in the pleistocene strata. There is a double error in its popular name, for it is a true deer, between the fallow and reindeer, and though abundant in Ireland, it is not peculiar to that country, being found also in England, Scotland, and on the continent of Europe. In Ireland, it occurs in the shell marl underlying the extensive turbaries. In England, lacustrine deposits and brick-clay contain its remains, and, associated with the mammoth and rhinoceros, they are found also in ossiferous caves. The most striking feature in this animal was its enormous antlers. A straight line drawn between their extreme tips in one specimen measured 10 ft. 10 inches. The form of the antler differs from that of any living species of deer. The beam enlarges and flattens into a palm; a brow snag exists as in the fallow-deer, but in adult specimens, this bifurcates and expands somewhat as in the reindeer—a peculiarity never observed in the fallow-deer group. The antler is also furnished with a back snag. Some idea of the enormous size and weight of the antlers may be formed from the fact that, in a specimen where the head weighed 5½ lbs., their weight was 81 lbs. To sustain this, the vertebræ of the neck and the limbs are very much larger and stronger than in any other deer. A fine and almost perfect specimen of this animal, from the Isle of Man, exists in the Edinburgh museum.

ELK, MOOSE, or MOOSE DEER, *Alces malchis*, or *cervus alces*, the largest existing species of the *cervidae*, or deer family, is a native of the northern parts of Europe, Asia, and America. When full grown, it is about 6 ft. in height at the shoulders, and sometimes weighs 1200 lbs. The body is round, compact, and short; the neck is short and thick, unlike that of deer in general, but thus adapted for sustaining the great weight of the head and horns. The head is very large, narrow, about 2 ft. long. The horns in males of the second year are unbranched, not flattened and about 1 foot long; as the animal becomes older, they begin to display a blade, with more numerous snags, and in mature elks the blade becomes very broad, the snags sometimes 14 on each horn; a single antler has been known to weigh about 60 lbs. The horns have no basal snag projecting forwards. The ears are long, and have been compared to those of the ass. The eyes are small. The limbs are long, and very graceful. The tail is only about 4 in. long. The body is covered with coarse angular hair, which breaks when it is bent. On the neck and withers there is a heavy mane, and the throat is covered with long hair. A large goitre-like swelling under the throat of the younger elks has a very curious appearance. The hoofs of the E., like those of the reindeer and of the buffalo, are so constructed as to part widely, and to afford a better footing on soft marshy ground or on snow; they make a clattering when it runs. In running, it carries its muzzle forward, with the horns thrown back upon the neck, so that they may not be caught by branches. Its shoulders being higher than the croup, its common gait is a shambling trot; but it can also gallop with great rapidity. The color of the elk is brownish black, darker in winter than in summer; the limbs, the sides of the head, and the mane are of a lighter color than the body. Elks are sometimes seen in small herds, but often singly; they are now very rare in Europe, and are no longer found in parts of North America in which they were once common. They formerly extended as far s. as the Ohio. They are sometimes seen even on the shores of the Arctic ocean. They delight in marshy districts and in forests. When compelled to eat grass, they must get down on their knees to reach it; their proper food consists of the branches and foliage of shrubs and trees. They are very timid and inoffensive, except during the rutting season. A single stroke of an elk's fore-foot is sufficient to kill the strongest dog. It is also an extremely wary animal, and is with the greatest difficulty approached by the hunter. Its sense of smell is very acute, and the slightest sound excites its alarm. It is, however, much sought after in North America. In Sweden, its destruction is prohibited; and in Norway is placed under legal restrictions. The flesh of the elk is esteemed a good kind of venison; the fat is remarkably soft; the nose and the tongue are reckoned delicacies. The skin is used for a variety of purposes.

The elk is easily domesticated, and was at one time employed in Sweden for conveying couriers, being capable of traveling more than 200 m. in a day when attached to a sledge. See illus., DEER, ETC., vol. IV.

ELK CREEK, a magisterial dist., Grayson co., Va.; containing the town of Independence. Pop. '90, 5486.

ELKESAITES, or **ELCESAITES**, Jewish Christians of the 2d c., who held as the highest authority a work known as the *Book of Elcai*. This book was known to Origen, who reports that it was believed to have fallen from heaven, and was revealed by an angel who was the son of God. Its contents were made known only upon a pledge to keep them secret. Apparently the object of the sect was to mingle Judaism and Christianity, so that the Hebrews of that day could embrace the new doctrines without entire repudiation of their old belief. The fullest account of the *Book of Elcai* is found in the *Philosophoumena* of Hippolytus.

EL-KHAR GEH, capital of the Great Oasis, Upper Egypt, is situated in lat. 25° 28' n., long. 30° 40' east. In the vicinity of the town are numerous ruins, among which are those of a temple; there is also a remarkable necropolis.

ELKHART, a co. in n. Indiana, on the Michigan border, intersected by the St. Joseph's river and the Lake Shore and Michigan Southern railroad; 470 sq. m.; pop. '90, 39,201. The surface is generally level, with extensive oak and maple forests. The soil is fertile, producing wheat, corn, etc. Co. seat, Goshen.

ELKHART, a city in Elkhart co., Ind., on St. Joseph's river, and Lake Shore and Michigan Southern and other railroads, 101 m. e. of Chicago. It has fine churches and schools, and abundant water-power, supplying a rolling-mill, railroad shops, carriage, paper, starch, chewing-gum, bicycle, printing press, and musical instrument factories; electric light and water-works, several banks, electric street railroads, business colleges, and daily, weekly, and monthly periodicals. Pop. '90, 11,360.

ELKINS, STEPHEN BENTON, b. O., 1841, graduated from the Mo. univ., 1860; was a member of the territorial legislative assembly of N. Mex.; and was atty.-gen. and U. S. dist. atty. in that territory. He was elected as a republican from N. Mex. to the XLIII and XLIV congresses. E. was one of the defendants in the "Star Route" trials, and was acquitted, 1882. He became secretary of war in 1891, and U. S. senator from West Virginia in 1894.

ELKO, a co. in n.e. Nevada, drained by the sources of the Humboldt and Owyhee rivers, and crossed by the Southern Pacific railroad; 17,652 sq. m.; pop. '90, 4794. The surface is rough, five or six mountain ranges running n. and s. There are valuable mines, especially of silver. Co. seat, Elko.

ELL (allied to elbow, Ger. *ellenbogen*, Lat. *ulna*, the fore-arm or arm in general) is a measure of length now little used. It was originally taken in some vague way from the arm, and hence has been used to denote very different lengths. The Latin *ulna* appears to have denoted sometimes the measure from the elbow to the tips of the fingers, sometimes that between the outstretched hands. The English ell, as a measure of cloth, is equal to five quarters of a yard (q.v.).

ELLAG'GIC ACID, a constituent of animal secretions such as the bezoar stones found in the antelope. It may be produced by the decomposition of gallic acid.

ELLENBOROUGH, EARL OF. Edward Law, first earl of E., son of the first baron (many years chief-justice of the king's bench), was b. 1790; educated at Eton and at St. John's college, Cambridge, where he graduated M.A., 1809; succeeded his father in the barony in 1818; was lord privy seal in the duke of Wellington's administration, 1828-29; president of the board of control during the short-lived Peel administration of 1834-35; and appointed, on the return of sir Robert Peel in Sept., 1841, to the same office, which he relinquished a month afterwards for the post of governor-general of India. He received the thanks of parliament in 1843 for his "ability and judgment" in supporting the military operations in Afghanistan. In many other respects, his Indian administration was open to censure. He was charged with reserving his favor for the military, and inflicting undeserved slights upon the civil servants of the company. He made showy progresses; addressed proclamations to the rulers and natives of India which appeared to sanction idolatry; and, finally, in his proclamation concerning the sandal-wood gates of the temple of Juggernaut, when brought back from Ghuznee, he reached the climax of a series of extravagances, which induced the directors of the East India company to exercise a power only used in extreme cases, and to recall him. The ministry, however, stood by him, and he was created by the crown an earl and a viscount; he also received the distinction of G.C.B. In 1846, sir R. Peel made him first lord of the admiralty, an office which he resigned in July of the same year, when the disruption of the Peel administration took place. In the Derby administration of 1858, he was again minister for India, and the author of an India bill, which failed to obtain the sanction of parliament. Having permitted a dispatch to see the light, in which he had administered a severe and caustic rebuke to viscount Canning, governor-general of India, an outcry was raised against him, which threatened the existence of the Derby government. To avert this result, lord E. resigned. He afterwards took a frequent and influential part in the debates of the upper house. He was styled, by no less a judge than M. Guizot, "the most brilliant of the tory orators." He was twice married—first to a daughter of the marquis of Londonderry, and second to the daughter of Admiral Digby. His divorce from the latter made some noise at the time. E. died without issue, Dec. 22, 1871, when the earldom and viscounty became extinct.

ELLENBOROUGH, EDWARD LAW, Lord, 1750-1818; chief-justice of the court of king's bench; educated at Cambridge, and a fellow of Trinity college; studied law, and was called to the bar in 1780, speedily gaining a large practice and a high reputation. He was principal counsel for Warren Hastings in the famous impeachment trial. He began political life as a whig, but the French revolution made him a supporter of Pitt. In 1801, he was appointed attorney-general; the next year he succeeded to the king's bench as chief-justice, and at the same time was made a peer. He was also a member of the Grenville cabinet. As a judge he showed profound legal knowledge, and was especially an authority on mercantile law; but he was harsh and overbearing to counsel, and generally against any prisoner tried for a political offense. In the trial of Hone for blasphemy he directed the jury to return a verdict of guilty, but they brought in one for acquittal—an event which is thought to have hastened the judge's death.

ELLENRIEDER, MARIE, a female painter of very high excellence, was b. at Constance in 1791, studied in Munich, and in 1820 went to Rome, to perfect her knowledge

of art. Her admiration of the old German masters gave a religious bent to her genius. On her return to Germany, she resided for some time at Carlsruhe, where she painted a "Martyrdom of St. Stephen" as an altar-piece for the Roman Catholic church. She was afterwards appointed court-painter at Munich, but she chose to fix her residence at Constance, and devoted herself exclusively to her profession. Among her principal pieces are the "Transfiguration of St. Barthelemy;" "Christ Blessing Little Children;" "Mary and the Infant Jesus;" "Joseph and the Infant Jesus;" "St. Cecilia;" "Faith, Hope and Charity;" and a Madonna. Marie E. is reckoned in Germany the greatest female artist of the present age. So full of ideal grace and beauty are the heads of her women and children, in particular, that it has been said that "she seems to paint in the presence of angels;" her coloring, however, is gray, dull, and somber, like that which prevails among the old masters of the German school. She died in June, 1863.

ELLERY, WILLIAM, 1727-1820; b. R. I.; graduated at Harvard, and went into trade in Newport; afterwards began the practice of law, and in 1776 was elected to the continental congress, where, with his fellow member from Rhode Island, Stephen Hopkins, he signed the declaration of independence. With the exception of the two years 1780 and 1782 he was in congress until 1786, and was one of the most influential members. In 1790, he was appointed collector of customs at Newport, and held the office during life.

ELLESMERE, a t. in the n.w. of Shropshire, near a beautiful lake or mere, 19 m. n.n.w. of Shrewsbury. The Ellesmere canal opens navigation between Chester and Ellesmere Port. On the present site of a bowling-green once stood an ancient castle, alternately held by the English and Welsh.

ELLESMERE, first EARL OF, politician, patron of the arts, and author. Francis Egerton, second son of the first duke of Sutherland, was b. 1800; graduated at Christ Church, Oxford, where he was second-class in classics, 1820; entered the house of commons, 1820, and represented successively Bletchingly, Sutherland co., and South Lancashire; filled the office of chief-secretary for Ireland from Jan., 1828, to July, 1830, and secretary at war from July to Nov., 1830; in 1833, assumed the name of lord Francis Egerton, in lieu of his patronymic Leveson-Gower. He achieved considerable literary distinction as a writer of graceful poems, translations from the German, etc. He also published a pamphlet on the defenseless state of the coasts and of the metropolis, which called forth some adverse criticism. He was a munificent patron of the arts, and made many valuable additions to the collection of pictures which he inherited with the large estates of the last duke of Bridgewater. He also built a noble gallery for their reception, which he liberally threw open to the public. After faithfully voting with the conservative party in parliament for a quarter of a century, he, on the retirement of the Peel administration in 1846, obtained a revival in his favor of the peerages of Ellesmere and Brackley. His last public appearance was in May, 1856, when he moved, in the house of lords, an address to the crown, approving of the treaty of peace after the war with Russia. He died in 1857 at his new mansion, Bridgewater house, London, and was succeeded in the earldom by his eldest son, viscount Brackley.

ELLET, CHARLES, JR., 1810-62; b. Penn.; an engineer, builder of the first wire suspension bridge in the United States (over the Schuylkill, at Fairmount, near Philadelphia); architect of the first suspension bridge over the Niagara river below the falls, and of the first one at Wheeling. During the war of the secession he built a number of steam rams for the western rivers, with which he took part in the battle in the Mississippi at Memphis, June 4, 1862, sinking or disabling a number of confederate vessels. He received a wound on that occasion, from the effects of which he died.

ELLET, ELIZABETH FRIES, 1818-77; b. N. Y.; wife of William H., and author of sketches, poems, etc. At 17 years of age she published a volume of poems, and about the same time wrote *Teresa Contarini*, a tragedy based on Venetian history. In 1841, she published *The Characters of Schiller*, following with *Women of the American Revolution*; *Evenings at Woodlawn*; *Family Pictures from the Bible*; *Domestic History of the American Revolution*; *Watching Spirits*; *Pioneer Women of the West*; *Novelettes of the Musicians*; *Summer Rambles in the West*; *Women Artists in All Ages and Countries*; *Queens of American Society*; and *Court Circles of the Republic*. She was also a frequent contributor to periodicals.

ELLET, WILLIAM HENRY, 1806-59; b. N. Y.; graduated from Columbia college, where he was professor of chemistry in 1832; in 1835, professor of chemistry, mineralogy, and geology in South Carolina college. The South Carolina legislature presented him with a testimonial for the discovery of a cheap method of manufacturing gun-cotton. His latest work was that of consulting chemist to one of the great gas manufacturing companies of New York.

ELLEZELLES, a large village of Belgium, in the province of Hainault. Linen-weaving is extensively carried on. There are several flour-mills, breweries, and a salt-refinery. Pop. about 5300.

ELLICOTT, ANDREW, 1754-1820; b. Penn. His scientific attainments caused his employment at various times for marking the boundaries of Virginia, New York, and Pennsylvania; and in 1789 he surveyed the country between Pennsylvania and

lake Erie, making the first accurate measurement of Niagara river. In 1790, he laid out the proposed city of Washington, now the federal capital, and in 1796 he was one of the commissioners to settle the southern boundary between the United States and Spanish territory. Later in life he was professor of mathematics at West Point. He was an active member of the American philosophical society, and a frequent contributor to the *Transactions* of that body.

ELLICOTT, CHARLES JOHN, D.D., b. 1819; bishop of Gloucester and Bristol. He graduated at Cambridge in 1841, and was ten years rector of Pilton, Rutlandshire, but in 1858 became professor of divinity in King's college, London, and in 1860, Hulsean professor of divinity at Cambridge. In 1861, he was made dean of Exeter, and in 1863 bishop. He is the author of a *Treatise on Analytical Statics*; *The History and Obligation of the Sabbath*; *Lectures on the Life of our Lord Jesus Christ*; and *Considerations on the Revision of the English Version of the New Testament*; but his most important works are *Commentaries* on a number of the New Testament Epistles, eminent for thoroughness of grammatical criticism. He was a member of the New Testament Revision Committee.

ELLICOTT CITY, city and co. seat of Howard co., Md., on the Patapsco River and the Baltimore and Ohio railroad, 10 m. w. of Baltimore. The water-power is abundant, and there are granite quarries, cooper shops, flour mills, Rock Hill and St. Charles's colleges, electric lights, national bank and weekly newspapers. Pop. '90, 1488.

ELLIOTT, a co. in n.e. Kentucky, drained by the head-waters of the Little Sandy river; area, 270 sq.m.; pop. '90, 9214, incl. colored. It is hilly, with much forest land. Productions, wheat, corn, etc. Iron ore and coal are found. Co. seat, Sandy Hook.

ELLIOTT, CHARLES, D.D., LL.D.; 1792-1869; b. Ireland, where he joined the Wesleyan Methodists, and prepared for the ministry. At the age of 23, he came to America, and in 1818 joined the Ohio conference; in 1822, he was superintendent of missions among the Wyandot Indians; afterwards for five years presiding elder of the Ohio district; then for four years professor of languages in Madison college (Uniontown, Penn.). He was a few years later presiding elder of the Pittsburg district, editor of the *Pittsburg Conference Journal*, and subsequently of the *Western Christian Advocate* (Cincinnati). In 1857, he became professor of Biblical literature and president of the Iowa Wesleyan university. About 1860, he became editor of the *Central Christian Advocate* at St. Louis. Among his works are *Treatise on Baptism*; *Delineation of Roman Catholicism*; *History of the Great Secession from the Methodist Episcopal Church*; *Political Romanism*; *Reminiscences of the Wyandot Mission*; *South-western Methodism*; works against slavery, biographies, etc.

ELLIOTT, CHARLES LORING, 1812-68; b. New York, the son of an architect. Having an inclination for painting, he became a pupil of Trumbull, and afterwards of Quidor. He was for some time in New York city, where his efforts began to attract attention. After working chiefly on portraits for several years in the w. part of the state, he returned to the city, where he soon became the chief of portrait painters, having at his easel many hundreds of the most eminent citizens.

ELLIOTT, CHARLES WYLLYS, b. Conn., 1817; a descendant of the "apostle to the Indians." He began business as a merchant in New York, took up the study of horticulture and landscape gardening with A. J. Downing, and practiced the business in Cincinnati. Returning to New York, he became one of the founders of the "Children's Aid Society," and was chosen a commissioner to lay out the Central Park. He d. 1883.

ELLIOTT, EBENEZER, the CORN-LAW RHYMER, was b. at Masborough, in Yorkshire, Mar. 7, 1781. His father was a man of strong character and narrow opinions, and as appears from Ebenezer's autobiography (published in the *Athenæum* in 1850), exercised no little influence on his son's modes of thinking and sympathies. When a boy at school, E. was not a quick pupil; and even after his father had sent him to work in the iron-foundry, where he himself held the situation of a clerk, the youth exhibited no fondness for reading. Before long, however, he entirely changed, and commenced to study Milton, Shakespeare, Ossian, Junius, and other authors. His first published poem was composed in his 17th year; it is entitled *The Vernal Walk*. This was succeeded by *Night*; *Wharnccliffe*; etc. In 1821, E. began business as an iron-founder on his own account at Sheffield. He was very successful; and in 1841 retired to an estate which he had purchased at Great Houghton, near Barnesley, where he died 1st Dec., 1849. E.'s principal productions are *Love*, accompanied with a letter to lord Byron; his famous *Corn-law Rhymes*; *The Ranter*; and *The Village Patriarch*, a work full of noble and earnest poetry, all of which appeared between 1823-31. In 1834, he issued a collected edition of his works, in 3 vols.; and in 1840, an edition in one volume. E. followed Crabbe, but with more depth and fire of feeling, in depicting the condition of the poor as miserable and oppressed, tracing most of the evils he deplores to the social and political institutions of the country. The laws relating to the importation of corn were denounced by E. as specially oppressive, and he inveighed against them with a fervor of manner and a harshness of phraseology which ordinary minds feel as repulsive, even while acknowledged as flowing from the offended benevolence of the poet. But the glow of earnestness kindles his verse, and hides a multitude of faults. More enduring, however, than his rhyming philippics, are his descriptions of English, and especially of Yorkshire scenery, and his delineations of humble virtue and affection. These are instinct with the purest spirit of poetry.

ELLIOTT, JESSE DUNCAN, 1782-1845; b. Philadelphia; midshipman in the U. S. navy in 1804, rising to capt. in 1818. He was in the *Essex* in the war with Tripoli, and on the lakes under Perry and Chauncey in the war of 1812, where he commanded a boat expedition which captured two English brigs. In Perry's great victory, Elliott commanded the *Niagara*. He succeeded Perry in command on the lakes; in 1815, he was in the Mediterranean squadron; was commissioner to select sites for dockyards, light-houses, and fortifications on the North Carolina coast; and later, commanded the *Constitution* in the Mediterranean. His conduct did not meet with approbation, and he was tried by court-martial and suspended for four years. A portion of the sentence was remitted, and he was made commandant of the Philadelphia navy-yard in 1844.

ELLIOTT, ROBERT WOODWARD BARNWELL, D.D., b. S. Car., 1840; son of Bp. Stephen; graduated from S. Car. coll., 1861; was ordained priest in the Prot. Epis. church, 1871. He had charge of mission stations in Ga.; was assistant minister of the church of the Incarnation, and of the chapel of the Reconciliation, New York; was rector of St. Philip's church, Atlanta, Ga.; was consecrated missionary bp. of Western Texas, 1874, and died Aug., 1887.

ELLIOTT, STEPHEN, LL.D., 1771-1830; b. S. C.; a botanist; graduate of Yale. He was instrumental in establishing the literary and philosophical societies of South Carolina, and was their president. He also assisted in establishing the state medical college, of which he was one of the faculty. He published *The Botany of South Carolina and Georgia*. He was for a time the editor of *The Southern Review*.

ELLIOTT, STEPHEN, D.D., 1806-66; son of the botanist; b. S. C.; graduate of Harvard; a lawyer until 1833; ordained in the Protestant Episcopal church, 1836. Soon afterwards he was appointed professor of sacred literature in South Carolina college. In 1840, he was chosen Protestant Episcopal bishop of Georgia.

ELLIOTT, WILLIAM, 1788-1863; b. S. C.; studied at Harvard; was in both branches of the legislature of his state, and in 1832 resigned rather than support nullification. He published *Fiesco*, a tragedy; *Carolina Sports by Land and Water*; and many political letters and essays.

ELLIPSE is the name of a figure in geometry, important from its being the approximate shape of the planetary orbits. It is a curve of the second order, and is a conic section, formed by cutting a right cone by a plane passing obliquely through its opposite sides. It may be defined as a curve, the sum of the distances of every point in which from two fixed points within the curve is always the same. These two fixed points are called the foci; and the diameter drawn through them is the major axis; the minor axis bisects the major at right angles. The distance of either focus from the middle of the major axis is the *eccentricity*. The less the eccentricity is compared with the axis, the nearer the figure approaches to a circle; and a circle may be considered as an E. whose foci coincide.

There are various contrivances for describing an E., called ellipsagraphs or *elliptic compasses*. The simplest method of description is to fix on a plane the two ends of a thread with pins in the foci, and make a pencil move on the plane, keeping the thread constantly stretched. The end of the pencil will trace an E., whose major axis is equal to the length of the thread.

The equation to an E. (see CO-ORDINATES), referred to its center as origin, and to its major and minor axes as rectangular axes, is $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, where a and b are the semi-major and semi-minor axes respectively. From this equation, it may be shown, by the integral calculus, that the area of an E. is equal to πab ; or is got by multiplying the product of the semi-major and semi-minor axis by 3.1416. It may also be shown that the length of the circumference of an E. is got by multiplying the major axis by the quantity $\pi \left(1 - \frac{d^2}{2^2} - \frac{3d^2}{4^2} - \frac{3^2 \cdot 5d^2}{2^2 \cdot 4^2 \cdot 5^2} - \text{etc.}\right)$, where $d = \frac{1-4b^2}{4a^2}$.

ELLIP'SIS (Gr. omission) is a term used in grammar and rhetoric, to signify the omission of a word necessary to complete the expression or sentence in its usual form. The object of E. is shortness and impressiveness; accordingly, it prevails in proverbs. Ellipses are used in all languages, but the same forms of ellipses are not common to all. Thus, "the house we saw," instead of "the house *that* we saw," is a kind of E. peculiar, so far as we know, to English.

ELLIP'SOID is a surface of the second order, of which the spheroid (q.v.) is a species, and the most interesting, from the fact of the form of the earth being spheroidal. The equation to an E. referred to its center and rectangular co-ordinates is $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$.

ELLIPTICITY (of the earth). See EARTH.

ELLIS, a co. in w. Kansas, drained by Saline and Smoky rivers, and crossed by the Union Pacific railroad; 625 sq.m.; pop. '90, 7942. It is mostly prairie, and the soil is fertile. Co. seat, Hays.

ELLIS, a co. in n.e. Texas, on Trinity river, intersected by the Houston and Texas Central railroad; 969 sq. m.; pop. '90, 31,774, includ. colored. The surface is undulating, with plenty of timber; soil fertile, producing corn, cotton, wheat, etc. Co. seat, Waxahachie.

ELLIS, ALEXANDER JOHN, F.R.S., F.S.A., was b. at Hoxton in 1814, and educated at Shrewsbury, Eton, and Trinity college, Cambridge, taking his B.A. degree in 1837. His name by birth was Sharpe, which was changed by royal license in 1825. He was elected a fellow of the royal society in 1864, and of the society of antiquaries in 1870. He was president of the philological society during 1872-74, and was a member of the philosophical and mathematical societies of London. Among his numerous and valuable works may be noted: *Alphabet of Nature* (1845); *Essentials of Phonetics* (1848); *Universal Writing and Printing* (1856); *Early English Pronunciation* (1869-71); *Practical Hints on the Quantitative Pronunciation of Latin* (1874); translation of and several appendices to Helmholtz's *Sensations of Tones as a Physiological Basis for the Theory of Music* (1875). He d. in 1890.

ELLIS, GEORGE EDWARD, D.D.; b. Boston, 1814; graduate of Harvard and of Cambridge divinity school; in 1840, Unitarian pastor in Charlestown, Mass.; resigning in 1869; in 1857, professor of doctrinal theology in the Cambridge divinity school. In 1864 he delivered the Lowell lectures on the evidences of Christianity. He wrote lives of John Mason, Anne Hutchinson, and William Penn, for Sparks's *American Biography*; and published the *Half Century of the Unitarian Controversy*; *The Aims and Purposes of the Founders of Massachusetts*; and various memoirs and biographies. For several years he was editor of the *Christian Examiner*. He d. in 1894.

ELLIS, SIR HENRY, English antiquary, was born in London in 1777, was educated at Merchant Taylor's School, and at St. John's College, Oxford, of which he became a fellow. He held a sub-librarianship in the Bodleian at Oxford for a few months and was then (1800) appointed to a similar post in the British Museum. He was chief librarian from 1827 to 1856, when he retired. In 1833 he was knighted by William IV. He edited Brand's *Antiquities* (1813), and published *Original Letters Illustrative of English History* (1824-46); *Introduction to Domesday Book* (1833); and works on the Townley and Elgin marbles. He d. in 1869.

ELLIS, ROBINSON, Latinist, was born in Barming, England, in 1834. He was educated at Rugby, and at Balliol college, Oxford, winning a fellowship at Trinity in 1858. In 1866, he published tentatively a small edition of Catullus, and in 1867 the large edition, which is one of the monumental works of English classical scholarship. In 1871, he put forth a metrical translation of the same poet, which was favorably received. He was called to the chair of Latin in University College, London, in 1870, and was for a time university reader in Latin literature at Oxford. In 1881 he published an edition of Ovid, and 1889 a second edition of his Catullus. In 1893 he became Professor of Latin at Oxford.

ELLIS, WILLIAM, an eminent English missionary, was b. August 29, 1794. In Jan., 1816, he sailed with his wife for the South Sea islands, as a missionary of the London missionary society, and labored there for nearly ten years. He set up in Tahiti the first printing-press in the South Sea islands. In 1824, he returned to England, on account of the illness of his wife. He was for some years employed at home in the business of the London missionary society. In 1826, he published a *Narrative of a Tour through Owhyhee*; and in 1829, *Polynesian Researches*, 2 vols. In 1839, he published a *History of Madagascar*, 2 vols., compiled from government papers, and information received from missionaries. In 1835, his wife died, and two years afterwards he married Miss Sarah Stickney, who for many years conducted a school for girls at Hoddesdon, in Hertfordshire, and who is well known as the authoress of many popular works, among which are *The Women of England* (1838), *The Daughters of England* (1842), *The Wives of England* (1843), *Hearts and Homes* (1848-49), and *The Mothers of Great Men* (1859). Her works are all of an excellent moral and religious tendency, and have been very widely circulated both in Britain and America. She was educated among the Society of Friends, to which her parents belonged.—In 1853, Mr. E. was sent to Madagascar by the London missionary society, to inquire into the state of things in that island, and particularly into the condition and prospects of the Christians there. In 1859, he published an interesting and valuable work, entitled *Three Visits to Madagascar, during 1853-56, with Notices of the People, Natural History, etc.*, a work to which we are largely indebted for our present information concerning that island. In his *Polynesian Researches*, as well as in this work, Mr. E. gives much information concerning the inhabitants, scenery, and productions of the countries which he visited, and few works of greater general interest or higher value have come from the pens of modern missionaries. In 1867, he published another work, the nature of which appears from its title, *Madagascar Revisited, describing the Events of a New Reign, and the Revolution which followed, setting forth also the Persecutions endured by the Christians, and their Heroic Sufferings, with Notices of the Present State and Prospects of the People*. He died in 1872.

ELLISTON, ROBERT WILLIAM, a distinguished English actor, was born in London in April, 1774, and was the son of a watchmaker. He was educated at St. Paul's school at the expense of an uncle, but ran away from home in 1791, and joined a theatrical company at Bath, making his first appearance, in a minor part, in that same year. In 1793 he was highly successful as Romeo; in 1796 appeared in London at the

Haymarket and Drury Lane. From 1804 to 1809 he was a member of the Drury Lane company, but after the theatre was burned, opened the Surrey theatre, returning to Drury Lane in 1812, where he took leading parts, withdrawing in 1815 after some experience as a provincial manager. He became lessee and manager of Drury Lane in 1819, but retired a bankrupt in 1826. Subsequently he played at the Surrey theatre, but his dissipated habits of long standing prevented him from regaining his old prestige, and he died of apoplexy, July 7, 1831. Elliston ranked among the great tragedians of his time and was no less remarkable as a comedian. Charles Lamb praised him enthusiastically and Leigh Hunt considered him the best lover on the stage both in tragedy and comedy. Amusing stories are told of his versatility and his self-conceit. See *Life*, by Raymond (2 vols. 1849).

ELLO RA, a decayed t. in the dominions of the Nizam, not far from the city of Dowlatabad, in lat. $20^{\circ} 2' N.$, and long. $75^{\circ} 13' E.$ It is celebrated for its wonderful rock-cut temples. Their number has not been precisely ascertained, but Erskine reckoned 19 large ones, partly of Hindu and partly of Buddhist origin. Some are cave-temples proper—i.e., chambers cut out in the interior of the rock—but others are vast buildings hewn out of the solid granite of the hills, having an exterior as well as an interior architecture, and being, in fact, magnificent monoliths. In executing the latter, the process was, first to sink a great quadrangular trench or pit, leaving the central mass standing; and then to hew and excavate this mass into a temple. The most beautiful of these objects is the Hindu temple, Kailasa. At its entrance, the traveler passes into an antechamber 138 ft. wide by 88 deep, adorned by numerous rows of pillars. Thence he proceeds along a colonnade over a bridge into a great rectangular court, which is 247 ft. in length and 150 broad, in the center of which stands the temple itself, a vast mass of rock richly hewn and carved. It is supported by four rows of pilasters, with colossal elephants beneath, and seems suspended in the air. The interior is about 103 ft. long, 56 broad, and 17 high, but the entire exterior forms a pyramid 100 ft. high, and is overlaid with sculpture. In the great court are numerous ponds, obelisks, colonnades, sphinxes, and on the walls thousands of mythological figures of all kinds, from 10 to 12 ft. in height. Of the other temples, those of Indra and Dumarheyna are little inferior to that of Kailasa. Regarding their antiquity and religious significance, authorities are not agreed; but at all events they must be subsequent to the epic poems *Ramayana* or *Mahabharata*, because they contain representations taken from these poems, and also to the cave-temples at Elephanta, because they exhibit a richer and more advanced style of architecture.

ELLORE, a t. of the district of Godavari, in the province of Madras, stands in lat. $16^{\circ} 42' N.$, and long. $81^{\circ} 10' E.$ According to the census of 1891, the pop. of E. was 29,400. E. was formerly an important military station, and has at present carpet manufactures. The town occupies both banks of the Jummulair, a torrent of the eastern Ghauts, which, instead of reaching the bay of Bengal, loses itself 3 m. further down, in the landlocked Colair lake. In fact, for about 50 m. to the westward of the sea, the neighboring country is depressed below the level of the maritime belt, the stagnant pool above mentioned not only having independent feeders of its own, but also receiving supplies, in the season of high-water, from the Kistnah or Krishna, and the Godavery. Under such circumstances, the climate of E. is at once unpleasant and unhealthy. During the s.w. monsoon, bringing with it, of course, the accumulated heats of the whole breadth of the peninsula, the temperature is more particularly oppressive, having been known to rise, in the night, to $120^{\circ} F.$

ELLSWORTH, a co. in central Kansas, on Smoky River, crossed by the Union Pacific and the St. Louis and San Francisco railroads; 720 sq. m.; pop. '90, 9272. The surface is nearly all prairie and the soil fertile, producing corn, wheat, etc. Co. seat, Ellsworth.

ELLSWORTH, a city, port of entry, and co. seat of Hancock co., Me.; on both sides of the Union river, 30 miles southeast of Bangor. It has an extensive trade in lumber and ice, a large number of vessels engaged in the cod and mackerel fishery, and manufactures of lumber, furniture, blinds, shoes, carriages and sleighs, sails and iron and brass. Several bridges cross the river at this point. The principal public buildings are a court house, custom house, high school, and public library. There are national and savings banks, building and loan association, and weekly newspapers. Pop. '90, 4804.

ELLSWORTH, EPHRAIM ELMER, b. N. Y., 1837; killed May 24, 1861, at Alexandria, Va. Before the civil war he organized a company of zouaves, with which he traveled in different parts of the country, in the summer of 1860, winning great praise by the perfection of their drill. In April, 1861, he organized a zouave regiment from the volunteer firemen of New York city. His regiment took part in the first advance of the national forces from Washington into Virginia. Ellsworth, as they entered Alexandria, went into a hotel to take down a secession flag which was flying from its roof, and while coming out it was met and shot dead by the landlord, who the next moment was also dead—killed by Ellsworth's soldiers.

ELLSWORTH, OLIVER, LL.D., 1745-1807; b. Conn.; graduated at the college of New Jersey in 1766, and began the practice of law at Hartford. He was a member of

the Connecticut general assembly, and in 1777, a delegate to Congress. From 1780 to 1784, he was a member of the council of Connecticut, and in the latter year was appointed judge of the superior court. In 1787, he was sent as a delegate to the convention which framed the first constitution of the United States. He was one of the first U. S. senators from Connecticut, and at the end of his term was nominated by Washington chief-justice of the U. S. supreme court. After five years' service he resigned; but in the mean time he was sent to France as one of the commissioners to negotiate a treaty with that nation. Returning to Connecticut, he was chosen chief-justice of the supreme court, but declined to accept the place.

ELLSWORTH, WILLIAM WOLCOTT, LL.D.; 1791-1868; son of Oliver; b. Conn.; graduate of Yale, and professor of law in Trinity college. He was judge of the supreme court of the state from 1847 to 1861, a member of congress in 1829, and governor of Connecticut in 1838-42.

ELL'WANGEN, a t. in Württemberg, 55 m. n.e. of Stuttgart; a place of considerable importance in manufacturing; pop. '90, 4606. It is the seat of government of the circle of Jaxt.

ELLWOOD, THOMAS, 1639-1713; an English author noted for his intimacy with Milton, whom he met through an introduction by a Quaker family, and to whom he became reader of Latin. Ellwood had become a Quaker, to his father's great disgust, and with the result of bringing upon himself much persecution. Milton gave Ellwood the manuscript of *Paradise Lost* to read, and asked his opinion of it. In returning it, Ellwood suggested *Paradise Found* as a subject; and this, as Milton long afterward said, suggested to his mind the supplementary poem of *Paradise Regained*. It may be the general opinion that it would have been as well for the great poet if Ellwood had kept his idea to himself. Ellwood was the author of a number of polemical works, among them *Forgery no Christianity*; *The Foundation of Tithes Shaken*; and *Sacred Histories of the Old and New Testaments*, and an autobiography, 1714.

ELM, *Ulmus*, a genus of trees of the natural order *ulmaceæ*, natives of temperate climates, with serrated leaves unequal in their two sides, and small flowers growing in clusters appearing before the leaves, and containing 4 to 12 stamens and one germen. The fruit is a samara, or compressed one-seeded little nut, winged all around. One of the most important species is the COMMON SMALL-LEAVED or ENGLISH ELM (*U. campestris*), a tree of 60 to 80 ft. in height, with ovato-elliptic, doubly serrated leaves, and flowers almost destitute of stalks. The wood is compact, and very durable in water. The tree is diffused all over Europe; is found also in the w. of Asia and n. of Africa, and is used for a great variety of purposes by wheelwrights, machine-makers, ship and boat builders, etc.; it is also prized by joiners for its fine grain, and the mahogany color which it readily assumes on the application of an acid. It is reckoned superior to the wood of any other species of elm. The bark is used in dyeing and in sugar-refining, and, in times of scarcity, has been used in Norway for grinding into meal and mixing in bread, which has a less disagreeable taste than that made from meal mixed with fir-bark. The inner bark is used medicinally in cutaneous diseases; it is mucilaginous, and has a bitter astringent taste. The ELM BALSAM (*beaume d'orme*), which was formerly in great repute, is a brownish substance, which is found in dried galls of the leaves in the s. of Europe, Persia, etc. From these galls, in an earlier stage, flows a clear, viscid, sweetish liquid, called elm water (*eau d'orme*), which is used for washing wounds, contusions, and sore eyes.—The seeds of the E. are eagerly eaten by pigeons and common poultry. The E. is one of the principal timber trees of Britain, most extensively planted, and a chief ornament of English scenery.—The CORK-BARKED ELM (*U. suberosa*), by many regarded as a variety of *U. campestris*, is distinguished by the corky wings of the bark of the branches. It is a taller and more spreading tree, with much larger leaves. It is a European tree, common in plantations in Britain, but a doubtful native.—The DUTCH CORK-BARKED ELM (*U. major*) is also looked upon by many as a variety of *U. campestris*. It is still more corky in its bark, and has still larger leaves. It is of very quick growth, but the wood is very inferior.—The BROAD-LEAVED or WYCH ELM (*U. montana*) is the only species that can with certainty be regarded as indigenous to Scotland. It has rough and broad leaves, a stem less upright than the English E., and large spreading branches. The wood is used for all the purposes of the English elm. The tree is of very quick growth. Protuberances of gnarled wood are not unfrequently produced, which are finely knotted and richly veined; they are much esteemed for veneering, and are sometimes very valuable. Varieties of this species are known as the GIANT ELM and CHICHESTER ELM.—The SMOOTH-LEAVED ELM (*U. glabra*) is by some regarded as a variety of *U. montana*, but is distinguished, besides other characters, by smooth leaves, which are much smaller. It is a native of England. A variety called the HUNTINGDON ELM is much esteemed.—The CORNISH ELM (*U. stricta*), found in the s.w. of England, is remarkable for its rigid, erect, and compact branches.—Very different is the habit of *U. effusa*, a continental species with a large spreading head and smooth bark, distinguished also by the long stalks of its flowers and its ciliated fruit. See illustration, HAZEL, etc., vol. VII., fig. 12.—The AMERICAN or WHITE ELM (*U. Americana*), which attains its loftiest stature between lat. 42° and lat. 46°, is a magnificent tree, sometimes 100 ft. in height, the trunk reaching 60 or

70 feet before it separates into branches, and the widely diffused pendulous branches floating gracefully in the air; but the timber is not much esteemed.—The RED or SLIPPERY ELM (*U. fulva*) is also common in the basin of the Mississippi as far s. as lat. 30°, and in western Canada and New England. It attains a height of 50 or 60 feet. The wood is more valuable than that of the last species, but much more inferior to the English elm. The leaves and bark yield an abundant mucilage, which is bland and demulcent, and esteemed a valuable remedy in catarrh, dysentery, and other complaints.—The WAHOO or WINGED ELM (*U. alata*) is a small tree, found from lat. 37° to Florida, Louisiana, and Arkansas, remarkable for the branches being furnished on two opposite sides with wings of cork. The wood is fine-grained, compact, and heavy. The CORKY WHITE ELM (*U. racemosa*) ranges from western New England to Wisconsin and southwards. Another species (*U. floridiana*) is found in Western Florida.—*U. chinensis* is a Chinese species of E., the leaves of which bear galls used in tanning and dyeing.

The name SPANISH ELM is given in the West Indies to a tree also called Bois DE CHYPRE, *cordia gerascanthus*, of the natural order *cordiaceæ*, the timber of which is valuable; also to *hamelia ventricosa*, of the natural order *rubiaceæ*, the timber of which is known to cabinet makers as prince-wood.

EL MAHDI. See MAHDI, EL.

ELMET, a small kingdom in ancient Britain, situated between Leeds and York, which retained its independence till it was conquered by Edwin, and annexed to Northumbria, abt. 625.

ELMINA, a fortified t. and seaport of West Africa, formerly capital of the Dutch settlements on the Gold Coast, is situated in an undulating and thickly wooded district, in lat. 5° 10' n., and long. about 1° 40' west. A few miles to the e. is Cape Coast Castle. E. was established by the Portuguese in 1481, and was the first European settlement on the coast of Guinea. It was taken by the Dutch in 1637, and four years after was ceded to them by Portugal. It was ceded to the British in 1872, and destroyed by them in 1874, during the Ashantee war. Pop. estimated at 10,530.

ELMIRA, city and co. seat of Chemung co., N. Y., on Chemung river, near the mouth of Newtown creek, and 57 m. w. of Binghamton. It was settled about 1790 and was chartered as a city in 1864. During the civil war it was a recruiting station and a depot for Confederate prisoners. It is entered by the New York, Lake Erie and Western, the Northern Central, the Delaware, Lackawanna and Western, the Tioga, and the Lehigh Valley railroads. It is attractively situated in a fertile region, and has Grove, Wisner, and Eldridge parks, Elmira College, Elmira Free Academy, Steele memorial library, Arnot-Ogden memorial hospital, Elmira Industrial School, Southern Tier Orphan Home, Home for the Aged, Y. M. C. A. building, Masonic Temple, a state reformatory, over thirty churches, several banks and a savings institution, electric lights and street railways, water works, and daily, weekly, monthly and quarterly periodicals. There are extensive car works, iron and steel rolling mills, and manufactories of boilers, steam engines, edge tools, steam fire engines, leather, flour, shoes, cigars, beer, bridges, woolen goods, glass, knit goods, etc., valued in 1890 at \$8,844,936. Pop. '70, 15,683; '80, 20,541; '90, 30,893.

ELMIRA COLLEGE, at Elmira, N. Y.; was founded at Auburn in 1852 as the Auburn Female University; went to Elmira the next year. It was long the only college in New York that offered advanced education exclusively to women. Five of the principal religious denominations must be represented on the board of trustees. The main building was erected in 1855. The Gillett memorial building was given to the college for a music school. There are two courses, the classical and the scientific, with the same requirements for admission. President, Rev. A. C. Mackenzie, D.D. There were in 1896, 14 instructors and 158 students, including 60 students of music.

ELMORE, a co. in central Alabama, intersected by the Coosa and bounded by the Tallapoosa river; 652 sq. m.; pop. '90, 21,732, includ. colored. Co. seat, Wetumpka.

ELMORE, a co. in s. western Idaho, bounded on the south by Snake river; formed from part of Alturas; 3000 sq. m.; pop. '90, 1870. Co. seat, Mountain Home.

ELMO'S FIRE, St., is the popular name of an appearance sometimes seen, especially in southern climates during thunder-storms, of a brush or star of light at the tops of masts, spires, or other pointed objects. It is sometimes accompanied by a hissing noise, and is evidently of the same nature as the light caused by electricity streaming off from points connected with an electrical machine. See ELECTRICITY. The phenomenon, as seen at sea, was woven by the Greeks into the myth of Castor and Pollux; and even yet such lights at the mast-head are considered by sailors a sign that they have nothing to fear from the storm.

ELMSHORN, a t. in the Prussian province of Schleswig-Holstein, 20 m. n.w. of Hamburg, is situated on both banks of the Krückau, a navigable stream, and feeder of the Elbe. Large numbers of boots and shoes are made at E. Pop. '90, 9533.

EL OBEID. See IL OBEID.

ELOCUTION (Lat. speaking out), the art of effective speaking, more especially of public speaking. It regards solely the utterance or delivery; while the wider art of oratory, of which E. is a branch, takes account also of the matter spoken. The art of E. held a prominent place in ancient education, but has been greatly neglected in modern times. See READING AND SPEAKING.

ÉLOGE. When a member of the French *académie* dies, it is customary for his successor to deliver an oration, setting forth his merits and services. This is called an *éloge* (Lat. *elogium*, Gr. *eulogia*, praise), and a considerable branch of French literature goes by the name. Many of the French *éloges* are mere florid panegyrics; but others, particularly those written by Thomas, D'Alembert, Bailly, Condorcet, Cuvier, and other eminent savants, are interesting and valuable biographies. The proper epoch of the *éloge* began with Fontenelle (2 vols., Par. 1731), who was distinguished for clearness, ease, and elegance. His successors have tried to outshine him in pomp of language.

ELOHIM, Hebr., plural of *Eloah*, Arab. *Ilāh*, Chald. *Elāh*, Syr. *Alōh*, might, power; in plur., intensified, collective, highest power—great beings, kings, angels, gods, *Deity*. As a *pluralis excellentie* or *majestatis*, and joined to the singular verb, it denotes, with very rare exceptions, *the One*, true God. Joined to the plural verb, however, it usually means gods in general, whether including the *One* or not. It is mostly used (in the singular sense) for or together with *Jehovah* (the Everlasting One); but some portions of the Scriptures employ exclusively either the one term or the other. This circumstance has given rise to endless discussions, and has also suggested amongst others the notion of different authors of Genesis. On this, and on the relation of those two words to each other, see the article **JEHOVAH**. We shall only mention here the hitherto unnoticed opinion of the Talmudists, that *E.* denotes the Almighty under the aspect of a God of strict justice; *Jehovah*, of clemency and mercy. As important for the history of the word *E.*, we may add, in conclusion, that it was very probably Petrus Lombardus who first tried to prove the Trinity out of this plural form—an attempt which, although unanimously and scornfully rejected by all scholars, from Calvin, Mercerus, Calixtus, the younger Buxtorf, etc., to our times, has lately been revived by Rudolf Stier, who has gone so far as to invent a new grammatical term, "*Pluralis Trinitatis*," for this purpose. See also the articles **SHEMITIC PLURAL** and **PENTATEUCH**.

ELOHIST AND **JEHOVIST**, terms adopted by a school of scriptural criticism which regards the Pentateuch as gathered from two sets of documents, in one in which the Deity appears under the name of "*Elohim*" (a plural form of "*Eloah*," *i.e.*, "*the mighty one*"); the other in which the Deity is called "*Elohim-Jahvé*" (the Massorets and later Jews substituted the vowels of "*adonai*," *i.e.*, "*the Lord*," for the proper vowel pointing of the Hebrew word represented by "*Jahvé*," or "*Yahvé*," regarded by them as "*an unspeakable word, which is usually translated 'I am that am,' thus giving the form 'Jehovah'*"). According to this school, the author of the Pentateuch, while rejecting polytheism, though retaining for the Deity, wherever he found it, the word "*Elohim*," compiled his work from two parallel traditions current among the earliest Semitic tribes. The Jehovist tradition is supposed to be older than the Elohist. Gen. i, and Gen. ii, 1-3, are supposed to be Elohist, but the rest of Gen. ii, with iii, iv., Jehovist. The late François Lenormant, a believer in inspiration and revelation, between which, however, he distinguished, held to this theory, as do Prof. Robertson Smith and many other scholars. By some of equal eminence it is stoutly opposed.

ELON, a district, with village of same name, in Amherst co., Va. Pop. '90, 4499.

ELONGATION, **ANGLE OF**, is the angle measuring the distance between two stars, as seen from the earth. Usually it is employed only in speaking of the distance of planets from the sun; the word "*distance*" being used instead of the word *E.*, in regard to fixed stars and planets, as related to one another.

ELOQUENCE is the oral or written expression of thoughts and truths in a manner adapted to convince or persuade hearers or readers, and excite them to corresponding action. In its highest form it is inspired by an earnest love of truth and right, and a hearty scorn for whatever is base and false. See **RHETORIC**.

ELOQUENT DOCTOR, **THE**, Doctor Facundus, a title given to Peter Aureolus, archbishop of Aix, in the fourteenth century.

EL PASO, a co. in central Colorado on the head-waters of the Arkansas river, intersected by the Denver and Rio Grande, and other railroads; 2660 sq. m.; pop. '90, 21,239. the surface is rough and the soil fertile; productions, chiefly agricultural, but valuable gold fields have recently been opened up at Cripple Creek. Pike's Peak, so long known as a guide for travelers over the plains, is one of its features. Co. seat, Colorado Springs.

EL PASO, the extreme w. co. of Texas, on the Rio Grande, and the New Mexico border; 8460 sq. m.; pop. '90, 15,678, includ. colored. Nearly the whole of the co. is sandy and barren, but there is some moderately good soil along the valley of the Rio Grande. Co. seat, El Paso.

EL PASO (Sp. "*the passage*"), city, port of entry, and co. seat of El Paso co., Tex.; on the Rio Grande, a little below a gap in the mountain through which that river flows, and at the junction of the Southern Pacific, Texas and Pacific, Atchison, Topeka and Santa Fé and Mexican Central railroads. It is 712 miles from Austin and 1209 miles from New Orleans, and is the chief thoroughfare between New Mexico and Chihuahua. Long an unimportant village, with a population in 1880 of only 736, it developed rapidly

after that date, and in 1890 had a population of 10,338. It has churches, schools, a \$200,000 Federal Building, several banks, and newspapers, a brisk business in grain and wool, an ore-smelting establishment, and varied manufactures. In the calendar year 1896, the imports aggregated \$7,110,117; exports, \$4,833,885, mostly gold and silver bullion.

EL'PHIN, a bishop's see in Ireland, united to Kilmore in 1833.

ELPHINSTONE, The Honorable MOUNTSTUART, 1779-1859, an English statesman. He was sent when but 17 years old by the East India company to Calcutta, became assistant to the British resident at Poonah in 1801, and later to sir Arthur Wellesley, to whom he acted as aid on the outbreak of war, and after the war was appointed resident at Nagpore. In 1808, he was envoy to the Afghan capital, Cabul, and in 1811 resident at Poonah. On the renewal of hostilities in 1817, he assumed command of the English troops during the battle of Kirkee, and contributed largely to their success. He subsequently governed the conquered districts with remarkable force and considerateness, preserving the native customs and rights, so as to win the regard of his subjects, and strengthen British rule. In 1820-27, he was lieutenant-governor of Bombay, and drew up the Elphinstone code. He is regarded as the founder of state education in India. He was twice offered the governor-generalship of India, but declined. His last 30 years were devoted to study and authorship. He wrote *An Account of the Kingdom of Cabul and its Dependencies in Persia and India*, and a *History of India*. Both are standard authorities.

ELPHINSTONE, WILLIAM, a celebrated Scottish prelate, and founder of King's college, Aberdeen, was b. in the year 1430 or 1431. He was the son of William Elphinstone, rector of Kirkmichael, and archdeacon of Teviotdale, and, as the marriage of ecclesiastics was then prohibited, his birth was illegitimate. E. studied at the university of Glasgow, where he took his degree of M.A. at the age of 24, at the same time that he took priest's orders. He seems to have acted as his father's curate at Kirkmichael for four years, but being strongly attached to the study of law (he had practiced as an advocate in the church courts before this), he went to France in his 29th year, at the instigation of his uncle, Laurence Elphinstone, who supplied him with the means of studying at the most celebrated schools of the continent. E. so highly distinguished himself, that after three years he was appointed professor in the university of Paris, and afterwards at Orleans, which had then the highest reputation as a legal school. So greatly were his learning and talents appreciated, that the parliament of Paris used to ask his opinion on great questions. After a residence of nine years abroad, he returned to Scotland, and was made successively official-gen. of the diocese of Glasgow (1471-72), rector of the university (1474), and official of Lothian in 1478, "then probably," says Mr. Cosmo Innes (*Sketches of Early Scottish History*, Edin. 1861), "the second judicial office in the kingdom, which he filled for two years, sitting in parliament, and serving on the judicial committees, which formed the supreme civil jurisdiction in Scotland." His dignity, learning, and prudence now began to procure him universal respect. He was the principal member of a great embassy sent from Scotland to France, to settle certain disputes that had sprung up between the two countries, and threatened the stability of their ancient alliance. In this important affair, he was eminently successful. On his return, he was made bishop of Ross in 1481. In 1483, he was removed to the see of Aberdeen; and between this period and the death of James III. he was several times engaged in embassies to France, England, Burgundy, and Austria. For a few months before the death of that monarch, he held the office of chancellor of the kingdom. He lost this great office on the accession of James IV., but, says the authority already quoted, "he was speedily restored to favor, and to the royal councils, and seems to have been keeper of the privy seal from 1500 till his death." He did not suffer his office to withdraw him from the care of his diocese, where he applied himself to the faithful discharge of his episcopal functions, endeavoring to reform the clergy, the service, and the ritual of his church. He next concluded (while on a mission to the continent for another purpose) a treaty with Holland, which was beneficial to Scotland. E. seems to have had a genuine desire for the enlightenment and improvement of his countrymen. Whenever leisure permitted, we find him engaged in devising means to this end. It appears to have been chiefly through his influence that the first printing-press—that of Chepman and Miller—was established in Scotland. He superintended the preparation and printing of the *Breviary of Aberdeen*, and collected the materials for the lives of the Scottish saints contained in that work. He procured from the pope (Alexander VI.) a bull for erecting a university in Aberdeen. The bull was sent in 1494, but the college was not founded till 1500, when it was dedicated to St. Mary—a name afterwards changed to King's college. E. built also the great central tower and wooden spire of his cathedral church at Aberdeen, provided its great bells, covered the roofs of its nave, aisles, and transept with lead; and, at his own expense, built a stone bridge over the Dee for the benefit of his townsmen. The fatal battle of Flodden, 9th Sept., 1513, broke the spirit of E., who was never seen to smile after. He died 25th Oct., 1514, and was buried before the high altar of the chapel of the college which he founded. E. was a man of great vigor of mind and nobleness of nature—"one of those prelates," says a writer in the *Quarterly Review* (No. clxix., p. 141), "who in their munificent acts, and their laborious and saintly lives, showed to the Scottish church, in her

corruption and decay, the glorious image of her youth." "We know him," says Mr. Innes, "in the history of the time as the zealous churchman, the learned lawyer, the wise statesman; one who never sacrificed his diocesan duties to mere secular cares, but knew how to make his political eminence serve the interests of his church; who, with manners and temperance in his own person, befitting the primitive ages of Christianity, threw around his cathedral and palace the taste and splendor that may adorn religion, who found time, amidst the cares of state and the pressure of daily duties, to preserve the Christian antiquities of his diocese, and collect the memories of those old servants of truth who had run a course similar to his own; to renovate his cathedral service, and to support and foster all good letters, while his economy of a slender revenue rendered it sufficient for the erection and support of sumptuous buildings and the endowment of a famous university." Some volumes of notes made by E. when studying in the law schools, are preserved in the library of the university of Aberdeen. A transcript of Fordun's *Scotichronicon*, with some additions, in the Bodleian library at Oxford, was long erroneously ascribed to him. His *Breviarium Aberdonense*, printed in 1509-10, was reprinted in two vols. 4to at London in 1853.

EL ROSARIO, a small t. of the Mexican confederation in the state of Cinaloa, is situated about 35 m. e.s.e. of Mazatlan. It is important chiefly as being a commercial entrepôt between Mazatlan and the interior. Pop. 5,000.

ELSASS AND ELSASS-LOTHRINGEN. See **ALSACE**.

ELSBURG, LOUIS, M.D., 1836-85; b. in Iserlohn, Westphalen; d. New York. He was educated at the Philadelphia high school, and Jefferson med. coll., Philadelphia; was resident physician in Mt. Sinai hospital, New York. In 1859 he devoted himself exclusively to laryngology, and became prof. of throat diseases in the univ. of New York, which he relinquished for a similar position in Dartmouth coll. He was one of the founders of the Polyclinic institute, New York. Dr. E. was editor of *Archives of Laryngology*; and wrote *Throat and Voice*, and *Harmony, Sound, and Music*. He was the first to illustrate the character of undertones and the division of sound; and invented many instruments which are used almost exclusively in operations on the throat and ear.

ELSLINORE' (Dan. *Helsingör*), a t. and seaport of Denmark, on the island of Seeland, is situated on the western shore of the sound, and at its narrowest part, $3\frac{1}{2}$ m. w.s.w. of the town of Helsingborg in Sweden, and 24 m. n. of Copenhagen. Lat. $56^{\circ} 2' \text{ n.}$, long. $12^{\circ} 36' \text{ east.}$ The town, which has been in recent times considerably improved, is spacious, and consists of one long principal street, with several lateral branches. The cathedral, containing some fine tombs, many of them very old, may be considered as one of the most interesting edifices. At a short distance to the e. of E. are the castle and the fortress of Kronborg, the former a white stone building in the Gothic style, and the latter, a stronghold mounted with guns that command the sound in all directions. To the n.w. of E., and in its immediate vicinity, is the royal château of Marienlist, the pleasure-grounds of which, occupying the crest of a hill, are open to the public. From the grounds of Marienlist, magnificent views may be had of the sound, of Helsingborg, and of the plains of Sweden. The harbor of E., formed by a wooden pier, is accessible to ships of light draught. E. has a brisk foreign trade, and has, besides, manufactures of straw-hats, arms, sugar, brandy, etc., also cotton-printing and fisheries. The sound dues (q.v.) were collected here. Pop. '90, 11,082.

Saxo Grammaticus, a famous writer of the 12th c., was born here. Here Shakespeare laid the scene of his *Hamlet*, a perversion of history on the part of the great dramatist, as Jutland, not Seeland, was Hamlet's country. The vaults under the castle of Kronborg were supposed to be the residence of Holger Danske, the mythic hero of Denmark, who never appeared above ground save when the country was in danger, and was then supposed to march at the head of the Danish armies. In severe winters the sound is frozen over at E., so that one can walk over the ice from Denmark to Sweden.

ELSSLER, FANNY, a celebrated dancer, was b. at Vienna, June 23, 1810, and educated at Naples for the ballet, along with her elder sister Theresa. The first triumph of the sisters took place at Berlin, where they appeared in 1830. The reputation acquired by Fanny in Berlin preceded her to France, America, England, and St. Petersburg, where her beauty, amiability, and mastery in her art, charmed all classes of society. In 1841, the two sisters went to America, where they excited unwonted enthusiasm. After Fanny had earned laurels in St. Petersburg, she returned, in 1851, to Vienna, to take a final leave of the stage. She then retired to Hamburg, where she remained, till in 1854 she settled finally in Vienna. Theresa was less graceful in her motions than her sister, but exhibited great strength, boldness, and agility. On the 25th April, 1851, F. became the wife of Prince Adalbert of Prussia (who died in 1873), and was ennobled by the king of Prussia. She d. 1884.

ELSTER, the name of two rivers of Germany, the white and the black Elster. The white E. rises at the foot of the Elster mountains, on the n.w. boundary of Bohemia, flows in a northerly direction, and falls into the Saale 3 m. s. of the town of Halle,

in Prussia. Its chief affluent is the Pleisse, from the right. Length, about 120 miles. The black E. rises in the kingdom of Saxony, within 2 m. of Elstra, flows n.w., enters Prussia, and joins the Elbe 8 m. s.e. of Wittenberg. Length, 130 miles.

ELSTRACKE, REGINALD or RENOLD, an English engraver, who flourished about 1620. He worked chiefly for the booksellers, and his plates, which are executed with the graver, without etching, are almost entirely confined to portraits. Prints from his plates are much sought after, not only from their scarcity, and as illustrating English history, but as works of art, in which much character is expressed in a firm and forcible manner. When he did not sign his plates with his name, he marked them with his initials, R. E.

ELTON, a famous salt lake of Russia, is situated in the government of Saratov, 170 m. s.e. from the town of that name, the lat. of its center being 48° 56' n., and the long. 46° 40' east. Its longest diameter is 11 m., and its shortest about 9 miles. It has a superficial extent of 45,500 English acres, but at no place is it more than about 15 in. in depth. It is of an oval form, and can be easily reached from the s., but the northern bank rises so rapidly that access to it from that quarter is difficult. In the hottest season, so wonderful is the illusion produced by the crystallized salt, that the lake seems covered with snow and ice. Its annual yield of salt is estimated at over 1,000,000 cwt., in the collection of which large numbers of persons are employed.

ELUTRIATION (from the Latin word "to cleanse"), is an operation for preparing clay for porcelain manufacture, and for glazing earthenware, and for other purposes. Different forms of apparatus are used; some employ vats containing grinding wheels, others only wheels for stirring; but a simple deep vat or hogshead will answer the purpose on a small scale, the stirring being done by hand, with a rod or paddle. The earth or clay being mingled with sufficient water to make it quite thin, is stirred and allowed to stand, till the coarser particles are precipitated. The finer particles, suspended in the water, may then be drawn off (a siphon may be used with advantage), and after they have subsided, may be collected. The process for filtering water in reservoirs supplying cities by which it is made to pass over and under diaphragms, so that both light and heavy impurities are separated, is a process of filtration by elutriation. Elutriation on a grand scale is exhibited by nature in the deposit of fine earths. The immense beds of fine potter's clay and kaolin covering many square miles in area, are the result of the slow subsidence of fine particles suspended in water passing in a slow but steady current in estuaries. The streams from the land carry down the turbid products of rain, depositing at first coarse gravel, then finer gravel, then coarse and fine sand, all the particles pursuing an oblique descent, more and more approaching the horizontal, till at last the impalpable particles of fine clay are slowly deposited over vast areas.

EL VANS are veins of a granular crystalline mixture of felspar and quartz, probably proceeding from a granite mass, which are found in granite rocks and fossiliferous slates in Cornwall, Devon, and the s. of Ireland.

EL VAS, an episcopal city and fortress of Portugal, stands in a very fruitful district on the eastern frontier of the province of Alemtejo, 10 m. w. of Badajoz, and 40 m. n.e. of Evora. It is the strongest fortress in Portugal, and one of the strongest in Europe. It is built upon a precipitous hill; is surrounded by walls, and by a glacis and covered-way. Besides these, E. has other defenses in two formidable forts, fort Sta. Lucia, and fort Lippe, the former to the s., and the latter—almost entirely shell-proof—to the n. of the city. E. is an old town; many of its houses are badly built. Its most striking architectural feature is an enormous aqueduct, which conveys water to it from a distance of 3 miles. This aqueduct consists of four tiers of arches built upon one another, and rising to the height of about 250 feet. The chief manufactures of E. are arms and jewelry. Pop. 10,478.

E. has undergone many sieges. The Spaniards besieged it in 1385, and again in 1659, when a famous battle took place called the Lines of Elvas, in which the Portuguese, though greatly inferior in numbers, drove the Spaniards from their lines in front of the town. During the Peninsular War it was a place of great strategic importance and in 1808 was captured by the French under Marshal Junot. It was soon afterwards given up in accordance with the terms of the Convention of Cintra. E. was raised to the rank of a city by D. Manoel, king of Portugal, in 1513.

ELVES. See FAIRIES.

ELY, so called from a Saxon word, *clig*, an eel, or *helig*, a willow, may be called a cathedral town rather than a city, and is situated on an eminence in that part of the fen-country of Cambridgeshire called the *Isle of Ely*. Pop. '91, 8017. The Eastern Counties and the Great Northern railways have each stations, the former outside, the latter in the town.

Ely Cathedral.—About the year 673, Etheldreda, daughter of the king of East Anglia, and wife of Oswy, king of Northumberland, founded a monastery here, and took on herself the government of it. Two hundred years afterwards (870), the Danes ravaged the isle, and destroyed the monastery, which was rebuilt in 970 by St. Ethelwold, bishop

of Winchester; and this continued till 1081, when a new church was begun, which was converted into a cathedral, and the abbey erected into a see in 1109. The possessions of the abbey were divided between the bishop and the community. The cathedral contains some beautiful specimens of architecture, especially of early Norman. Its exterior dimensions are 535 ft. from w. to east. The great cross or main transept is 190 feet. The turrets of the w. tower are 215 ft. high, and the lantern over the central tower 170 feet. The w. front was built by Geoffry Ridel, the third bishop, who died in 1189, and is of Norman work. About 200 years after his time, an addition of 64 ft. was made to the tower, and over that a spire. This great superincumbent weight crushed the n.w. transept, and the s.w. one, which still remains, was considerably weakened. In front there is a w. portico or galilee (q.v.), of early Gothic, said to be the work of bishop Eustachius. The nave is of Norman work, and was completed about 1174. The columns are alternately round and octagonal. The roof was, in 1861, beautifully painted. The transepts, which are the most ancient parts of the church, were built in the reign of Henry I. They had originally a middle and two side aisles, but the latter are, in the s. transept, walled up, and the space used as a vestry and library. Originally there stood a square tower in the center of the building, opening into the nave and transepts; but this gave way in 1322, and fell eastwards, crushing three arches of the choir. The repair of this dilapidation was undertaken by the sacrist at that time, Alan de Walsingham. The design was original, an octagon tower with four longer and four shorter sides, surmounted by a lantern. The upper part of this, which is of timber, has recently been rebuilt.

The choir contains some rich varieties of decorated Gothic, and the fine shafts of Purbeck marble combine beautifully with the white stone-work. The whole has lately been restored and beautified. Originally, it was much shorter eastwards, and protruded into the nave, but in 1235 the semicircular end of the old church was taken down, and six arches added by Hugh de Northwold. At the dedication and removal of the relics, Henry III. and his court were present. The e. end is eminently beautiful: it consists of two tiers of high lancet-shaped windows. Perhaps the most interesting and yet beautiful part of the building is the Lady chapel—an incomparable work, irreparably spoiled by the barbarism of Puritan times. It was begun in 1321, and finished in 1349, simultaneously with the rebuilding of the central tower and ruined choir, a circumstance highly illustrative of the taste and munificence of the times. It has a stone roof, like King's college chapel in Cambridge, which it is supposed to have suggested, and the walls were once decorated from top to bottom with countless niches and images of saints and martyrs, not one of which remains undefaced. Its length is 100 ft.; width, 46; height, 60. Bishop Alcock's chapel, in which he lies buried, is at the e. end of the n. aisle—an overloaded specimen of the richest florid Gothic. Bishop West's chapel, at the e. end of the s. aisle, is a more pleasing example of the same style.

Amongst the celebrated names connected with E. are abbot Thurstan, who defended the isle against William the Conqueror for seven years; Longchamp, chancellor and regent under Richard I.; chancellor Morton, Simon Patrick, and bishop Andrews. The bishops of E., like the bishops of Durham, formerly enjoyed a palatine jurisdiction, and appointed their own chief-justice, etc.; but this privilege was taken from them by the 6th and 7th Will. IV. The bishop of E. is visitor to St. Peter's, St. John's, and Jesus colleges, Cambridge, of which last he also appoints the master. There is a grammar-school attached to the cathedral, founded by Henry VIII. There are some interesting remains of the old conventual buildings in the neighborhood of the cathedral.

ELY, ISLE OF, the s. part of the Bedford Level, or the part of Cambridgeshire n. of the Ouse. It includes above a half of this county, is 24 m. long from n. to s., with an average breadth of 14 m., and contains four hundreds.

ELY, RICHARD THEODORE, economist, b. Ripley, N. Y., in 1854; graduated at Columbia college in 1876; received degree of PH.D. at Heidelberg in 1879; professor of political economy at Johns Hopkins university in 1885-92; became director of the school of economics of the university of Wisconsin in 1892. In 1894 an unsuccessful attempt was made to depose him on a charge of having taught objectionable socialistic doctrines. His publications include *French and German Socialism* (1883); *Labor Movement in America* (1886); *Taxation in American States and Cities* (1888); *Political Economy* (1889); *Outlines of Economics* (1893); *Socialism: an Examination of Its Nature, Its Strength, and Its Weakness: with Suggestions for Social Reform* (1894), etc.

ELYMAIS, an ancient province on the Persian gulf, supposed to have been a district of Elam (q. v.), though the name is sometimes used as equivalent to Elam.

ELYRIA, village and co. seat of Lorain co., Ohio, on Black river, 7 m. s. of lake Erie, 25 m. w. of Cleveland, on the Lake Shore and Michigan Southern and the Cleveland, Lorain, and Wheeling railroads. There are churches, high school, public and law libraries, screw shears and other manufacturing, gas and electric lights, national bank, and weekly newspapers. Sandstone is exported. Pop. '90, 5611.

ELYSIUM (Gr. *elysion*), a place in the infernal regions of the ancient classical mythology, where the souls of the good dwell after death. In the *Odyssey*, Homer describes it as a place where the souls of the departed lived in ease and abundance among innocent pleasures, and enjoying a mild and wholesome air. In the *Iliad*, however, he gives a sombre view of the state of the departed souls. Achilles, though in E., is made to envy the life of the meanest hind on earth. By succeeding poets, the bliss of E. is drawn

in much more lively colors. Besides the amenity and various delights of the place, diverse employments are found for the inhabitants, according to the ruling passion of each while on earth. E. was supposed by some writers to be in mid-air, by others in the sun, by others in the center of the earth, next Tartarus, by others in the Islands of the Blest.

ELZEVIER', or ELZEVIR, the name of a celebrated family of printers at Amsterdam, Leyden, and other places in Holland, whose beautiful editions were chiefly published between the years 1583 and 1680. Louis, the first of them, is said to have been born at Louvain about the year 1540. He was induced by religious disturbances to leave his native city, and in 1580, he settled as a bookbinder and bookseller in Leyden, where he died about 1617. The first work edited by him bears the title *Drusii Ebraicorum Quæstionum ac Responsionum Libri Duo, videlicet Secundus ac Tertius, in Academia Lugdunensi MDLXXXIII. Veneunt Lugduni Batavorum apud Elsevirium e Regione Scholæ Novæ*. The second, a Eutropius by P. Merula, bears the date 1592, and was long erroneously believed to be the first that issued from E.'s press. Five out of Louis' seven sons continued to carry on their father's business. Their names were Matthew, Louis, Aegidius, Jodocus (Joost), and Bonaventura. The last, in conjunction with his nephew Abraham E. (a son of Matthew), prepared the smaller editions of the classics, in 12mo and 16mo, which are still valued for their beauty and correctness. It is mainly on these that their reputation is based. The house of E., in Amsterdam, was established by Louis, the son of Jodocus E., in 1638. Peter E., grandson of the last mentioned, carried on the bookselling business in Utrecht, and died in 1696. For more than a century, however, this family has ceased to have any connection with book-printing. It is believed that 1213 works in all proceeded from the E. presses. Amongst the most beautiful are the editions of Pliny, Virgil, Livy, Tacitus, and Cæsar; and, though for Greek and Hebrew texts the house of E. was surpassed by that of Stephens (q.v.), their Latin classics are unrivaled both for beauty and correctness. It is said that the Elzeviers generally employed women to correct the press, under the conviction that they would be less likely than men, on their own responsibility, to introduce alterations into the text. Compare Adry, *Notice sur les Imprimeurs de la Famille des Elzeviers* (Paris, 1806), and Pieter's *Annales de l'Imprimerie Elzévirienne* (1852); Willems, *Les Elzeviers* (Brussels, 1880).

EMACIATION (Lat. *macies*), leanness. See CONSUMPTION, TABES DORSALIS.

EMANATION means, in general, efflux or issue. In theology and philosophy, it indicates an ancient doctrine, which considered all things as emanating or flowing from a supreme principle. According to this doctrine, the origin of things is only an overflowing of the divine fullness—an outstreaming of the light from the necessity of its nature, and not any free action on the part of God. What is thus given off as a copy from original perfection, departs more and more from its source, and gradually degenerates, which was thought to account for the origin of evil. This doctrine came from the east, and pervades the Indian mythology, the system of Zoroaster, and the Neo-Platonic philosophy of Alexandria. In Christian theology, the idea of E. has been applied to explain the relation among the persons of the Trinity.

EMANCHÉ. See MANCH.

EMANCIPATION. See SLAVERY.

EMANCIPATION, in the Roman law, was the act by which the *patria potestas* (q.v.), or paternal authority, was dissolved in the life-time of the father. It took place in the form of a sale (*mancipatio*) by the father or the son to a third party, who manumitted him. The Twelve Tables required that this ceremony should be gone through three times, and it was only after the third sale that the son became *sui juris* under his own law. In general, the son was at last resold to the father, who manumitted him, and thus acquired the rights of a patron (q.v.), which would otherwise have belonged to the alien purchaser who finally manumitted him. In the case of daughters and grandchildren, one sale was sufficient. If the child died intestate, or if he required a tutor or curator, the father's rights as patron came into play; but if the father died intestate, the son took nothing, because he was out of his family. But this rigor of the old law was modified by the prætor's edict, which placed all the children on the same footing. In the law of Scotland, E. is called forisfiliation (q.v.). The only case in which the term is employed in England is with reference to poor-law settlements. See POOR; POOR-LAWS; REMOVAL OF PAUPERS; SETTLEMENT.

EMANCIPATION, CATHOLIC. See ROMAN CATHOLIC EMANCIPATION.

EMANCIPATION, PROCLAMATION OF. The document issued by Abraham Lincoln, president of the United States, Jan. 1, 1863, declaring the immediate freedom of the great majority of the slaves in the United States, and striking a death-blow at the whole system of American slavery in this country, for the purpose of putting an end to the civil war then existing in the slave states and restoring the union on the basis of equal liberty for all men. For a long time President Lincoln hesitated, on constitutional grounds, to take this step, which he held to be within the power of the executive only as a measure of war. At length, however, a crisis arrived when he felt it to be not only a right but a duty to destroy the institution in which the civil war had its roots, and

which had long been the great embarrassment and opprobrium of the republic. The document, in view of its purposes and effects, must ever hold an important place in the national annals.

PROCLAMATION.

Whereas, On the 22d day of Sept., in the year of our Lord 1862, a proclamation was issued by the president of the United States, containing among other things the following, to wit:

That, on 1st day of Jan., in the year of our Lord 1863, all persons held as slaves within any state, or any designated part of a state, the people whereof shall then be in rebellion against the United States, shall be thenceforward and forever free, and the executive government of the United States, including the military and naval authority thereof, will recognize and maintain the freedom of such persons, and will do no act or acts to repress such persons, or any of them, in any efforts they may make for their actual freedom:

That, the executive will, on the 1st day of Jan. aforesaid, by proclamation, designate the states and parts of states, if any, in which the people thereof respectively shall then be in rebellion against the United States, and the fact that any State, or the people thereof, shall on that day be in good faith represented in the congress of the United States by members chosen thereto at elections wherein a majority of the qualified voters of such state shall have participated, shall, in the absence of strong countervailing testimony, be deemed conclusive evidence that such state and the people thereof are not then in rebellion against the United States:

Now, therefore, I, Abraham Lincoln, president of the United States, by virtue of the power in me vested as commander-in-chief of the army and navy of the United States, in time of actual armed rebellion against the authority and government of the United States, and as a fit and necessary war-measure for repressing said rebellion, do, on this 1st day of Jan., in the year of our Lord 1863, and in accordance with my purpose so to do, publicly proclaim for the full period of 100 days from the day of the first above-mentioned order, and designate as the states and parts of states wherein the people thereof respectively are this day in rebellion against the United States, the following, to wit: Arkansas, Texas, Louisiana, except the parishes of St. Bernard, Plaquemines, Jefferson, St. John, St. Charles, St. James, Ascension, Assumption, Terre Bonne, Lafourche, St. Mary, St. Martin, and Orleans, including the city of New Orleans, Mississippi, Alabama, Florida, Georgia, South Carolina, North Carolina, and Virginia, except the 48 counties designated as West Virginia, and also the counties of Berkeley, Accomac, Northampton, Elizabeth City, York, Princess Ann, and Norfolk, including the cities of Norfolk and Portsmouth, and which excepted parts are, for the present, left precisely as if this proclamation were not issued.

And by virtue of the power and for the purpose aforesaid, I do order and declare that all persons held as slaves within said designated states and parts of states are, and henceforward shall be, free; and that the executive government of the United States, including the military and naval authorities thereof, will recognize and maintain the freedom of said persons,

And I hereby enjoin upon the people so declared to be free, to abstain from all violence, unless in necessary self-defense, and I recommend to them, that in all cases, when allowed, they labor faithfully for reasonable wages.

And I further declare and make known that such persons of suitable condition will be received into the armed service of the United States to garrison forts, positions, stations, and other places, and to man vessels of all sorts in said service.

And upon this, sincerely believed to be an act of justice, warranted by the constitution, upon military necessity, I invoke the considerate judgment of mankind and the gracious favor of Almighty God.

In witness whereof, I have hereunto set my hand and caused the seal of the United States to be affixed.

Done at the city of Washington, this 1st day of Jan., in the year of our [L.s.] Lord 1863, and of the independence of the United States of America the 87th.

By the president:

ABRAHAM LINCOLN.

WILLIAM H. SEWARD, secretary of state.

The work of emancipation in the United States was completed at the adoption of article XIII. of the amendments to the constitution, and the reconstruction of the states in insurrection upon that basis. (See SLAVERY.)

EMANUEL, a co. in e. central Georgia, s.e. of Ogeechee river; 1028 sq. m.; pop. '90, 14,703, incl. colored. The surface is level and largely covered with pine forests; soil sandy, and not very productive. Cotton, corn, and pork are produced. Co. seat, Swainsboro.

EMANUEL I., King of Portugal, styled **THE GREAT**, and sometimes, likewise, **THE FORTUNATE**, was b. on the 3d May, 1469, and succeeded John H. in 1495. Before his accession to the throne, he bore the title of duke of Beja. On his accession, he prepared the code of laws which bears his name, and rendered himself remarkable by his zeal and exertions in the cause of education, by his active piety, and by his predilection for the society of artists and scholars. Through his exertions, Portugal became the

first naval power of Europe, and the center of the commerce of the world. He despatched Vasco da Gama to sail round the cape of Good Hope, and discover the passage to India. Cabral was commissioned by him to prosecute the discoveries of Vasco da Gama still further, and Corte Real to sail along the coasts of North America. The expeditions under Albuquerque put E. in possession of the s. coast of Africa and of the Indian archipelago. Not satisfied with this, he opened a communication with Persia, Ethiopia, and, in 1517, with China. At his death, 13th Dec., 1521, Portugal was in possession of a large fleet, strong fortresses, well-furnished arsenals, a warlike army, a flourishing trade and commerce, and extensive colonies. His reign has been termed the golden age of Portugal. E. was thrice married: first to Isabella, the daughter of Ferdinand; afterwards to Mary of Castile, her sister (by whom he had two children, John and Isabella, the former of whom succeeded him on the throne); and thirdly, to Eleanor of Austria, sister of Charles V.

EMARGINATE. See LEAVES.

EMBA, a river of Turkistan, in the Kirghiz territory, rises at the western base of the Muehajar or Mongol mountains, and flowing in a s.w. direction, enters the Caspian sea after a course of about 300 miles.

EMBALMING, the art of preserving the body after death, invented by the Egyptians, whose prepared bodies are known by the name of mummies, and are called in the hieroglyphs *sahu*, and by St. Augustine *gabbaroe*. This art seems to have derived its origin from the idea that the preservation of the body was necessary for the return of the soul to the human form after it had completed its cycle of existence of three or ten thousand years. Physical and sanitary reasons may also have induced the ancient Egyptians; and the legend of Osiris, whose body, destroyed by Typhon, was found by Isis, and embalmed by his son Anubis, gave a religious sanction to the rite, all deceased persons being supposed to be embalmed after the model of Osiris in the *abuton* of Philæ. The art appears as old as 4000 B.C., at least the bodies of Cheops, Mycerinus, and others of the age of the 4th dynasty having been embalmed. One of the earliest recorded embalmments on record is that of the patriarch Jacob; and the body of Joseph was thus prepared, and transported out of Egypt. The process has been described by Herodotus and Diodorus; but their accounts can only refer to their own age, and are only partially confirmed by an examination of the mummies. The following seems to have been the usual rule observed after death. The relations of the deceased went through the city chanting a wail for the dead. The corpse of a male was at once committed into the charge of the undertakers; if a female, it was retained at home till decomposition had begun. The *paraschistes*, or flank-inciser of the district, a person of low class, whose establishment was situated in the cemeteries or suburbs, conveyed the corpse home. A scribe marked with a reed-pen a line on the left side beneath the ribs, down which line the paraschistes made a deep incision with a rude knife or Ethiopian stone, probably flint. He was then pelted by those around with stones, and pursued with curses. Another kind of embalmer, the *taricheutes*, or preparer, then proceeded to remove the entrails and lungs, with the exception of the heart and kidneys. The brain was extracted by another taricheutes, by a crooked instrument, through the nose. All this having been effected, the body was ready for the salts and spices necessary for its preservation, and the future operations depended upon the sum to be expended on the task. When Herodotus visited Egypt, three methods prevailed: the first, accessible only to the wealthy, consisted in passing peculiar drugs through the nostrils into the cavities of the skull, rinsing the belly in palm-wine, and filling it with resins, cassia, and other substances, and stitching up the incision in the left flank. The mummy was then steeped in natron for seventy days, and wrapped up in linen, cemented by gums, and set upright in a wooden coffin against the walls of the house or tomb. This process cost a silver talent, which, considering the relative value of ancient money at one third of that at present, would amount to about \$3500. The second process consisted in removing the brain, as before, but only injecting the viscera with *kedrion*, or cedar oil, and soaking the corpse in a solution of natron for seventy days, which brought away or destroyed the viscera and soft portions, leaving only the skin and bones. The expense was a *mina*, relatively worth about \$1200. The third process, in use for the poorer classes, washed the corpse in myrrh, and salted it for seventy days. The expense was a trifle, not mentioned. When thus prepared, the bodies were ready for sepulture, but were often kept some time before being buried—often at home—and even produced at festive entertainments, to recall to the guests the transient lot of humanity. When buried, they were sent to the *cholchytæ*, a higher class than the *tarichsutæ*, who had charge of the tombs, the mummies, and the masses for the dead. All classes were embalmed, even malefactors; and those who were drowned in the Nile or killed by crocodiles received an embalmment from the city nearest to which the accident occurred. As the art, however, existed for many centuries, it may be easily conceived that mummies were preserved by very different means, and quite distinct from those described by classical authors, some having been found merely dried in the sand; others salted by natron, or boiled in resins and bitumen, with or without the flank incision, having the brains removed through the eyes or base of the cranium, with the viscera returned into the body, placed upon it, or deposited in jars in shapes of the genii of the dead, the skin

partially gilded, the flank incision covered with a tin plate, the fingers cased in silver, the eyes removed, and replaced. The mummies are generally wrapped in linen bandages, and placed in costly coffins. See *SARCOPHAGUS*. The sacred animals were also mummied, but by simpler processes than men. Mummies, it may be observed in passing, were used in the 15th and 16th centuries of the Christian era for drugs and other medical purposes, and nostrums against diseases, and a peculiar brown color, used at the background of pictures, was obtained from the bitumen. The Ethiopians used similar means to preserve the dead, and the successful nature of embalming may be judged from the numerous mummies in the different museums of Europe. Other less successful means were used by nations of antiquity to embalm. The Persians employed wax; the Assyrians, honey; the Jews embalmed their monarchs with spices, with which the body of our Lord was also anointed; Alexander the great was preserved in wax and honey, and some Roman bodies have been found thus embalmed. The Guanches, or ancient inhabitants of the Canary isles, used an elaborate process like the Egyptians; and desiccated bodies, preserved by atmospheric or other circumstances for centuries, have been found in France, Sicily, England, and America, especially in Central America and Peru. The art of embalming was probably never lost in Europe; and De Bils, Ruysch, Swammerdam, and Clauderus boast of great success in the art. There was a celebrated cabinet of M. De Rasière in 1727, containing prepared bodies; and the mode of embalming princes and others, by prepared balms and other substances, is detailed by Penicher, consisting in the removal and separate embalmment of the heart and viscera, and removing the brain, and introducing the preparations by incisions all over the body. Dr. Hunter injected essential oils through the principal arteries into the body. Boudet, during the French empire, embalmed the bodies of the senators with camphor, balsam of Peru, Jews' pitch, tan and salt; but the discovery of Chaussier of the preservative power of corrosive sublimate, by which animal matter becomes rigid, hard, and grayish, introduced a new means of embalming by Beclard and Larrey; but owing to the desiccation the features do not retain their shape. The discovery of the preservative power of a mixture of equal parts of acetate and chloride of alumina, or of sulphate of alumina, by Bannal in 1834, and of that of arsenic by Tranchini, and of pyroxilic spirits by Babington and Rees in 1839, and of the antiseptic nature of chloride of zinc, have led to the application of these salts to the embalming or preparation of bodies required to be preserved for a limited time; but there is no reason to believe that bodies so preserved will last as long as Egyptian mummies. See Pettigrew, *History of Mummies* (4to, Lond. 1834); Gannal, *Traité d'Embaumement* (8vo, Paris, 1838), translated by Harlan (8vo, Philadelph. 1840). See *ill.*, *EGYPTIAN DEITIES*.

EMBANKMENT, EARTHWORK. Embankments, in engineering, are masses of earth, rock, or other materials artificially formed, and rising above the natural surface of the ground. They are chiefly formed either (1) to carry railways, common roads, canals, etc., over depressions of the country; or (2) for hydraulic purposes, such as the formation of reservoirs for storing water; or as defenses against the overflowing of rivers, the encroachments of the sea, of lakes, etc.

In the formation of canals, railways, and other roads, embankment and *excavation* go hand in hand, and, under the name of *EARTHWORK*, form—especially in modern times, and since the development of the railway system—a vast branch of industry, giving employment to many thousands of laborers, known in England as “navvies.”

In planning works of the kind alluded to, engineers follow, as much as possible, the principle of making the cuttings or excavations and the embankments balance; i.e., of making the earth, etc., taken from the cuttings be sufficient for the formation of the embankments. See *RAILWAYS (ENGINEERING)*. In proceeding to the actual construction of a railway embankment, e.g., a beginning is made at the points where the level of the formation meets the surface of the ground; and on each side of these points the cutting is taken out, and the embankment formed by men using pick, shovel, and barrow, so that a roadway is formed for a distance of from 50 to 100 yards. When the “lead,” or the distance between the face of the cutting and the “tip-head,” or end of the embankment, is greater than this, it is no longer economical to use the barrow. To continue the cutting and embankment, several methods may be employed; the most common are dobbin carts; small wagons run upon light rails at a narrow gauge, and drawn by men or horses; ordinary earth-wagons drawn by horses, and occasionally by a locomotive; and, lastly, ballast-wagons or trucks drawn by a locomotive. The cost of earthwork naturally varies greatly with the nature of the strata in which the cutting has to be made, the length of the “lead,” and other circumstances. When rocks have to be cut through, blasting (q.v.) is had recourse to. One of the points on which considerable doubt existed was as to the inclination of the side-slopes of embankments; but it has been found that nearly all kinds of earthwork will stand at an inclination of $1\frac{1}{2}$ horizontal to 1 vertical. When, however, it is necessary to use very wet substances, such as peat-moss or wet clays, or when the embankment is of great height, a flatter slope may be necessary. In many cases, it is advisable to substitute a viaduct (q.v.) for an embankment. All embankments put in as above mentioned subside more or less, the subsidence being much more distinctly perceptible in clay than in gravel. When

clay is thrown by the wagon over a considerable tip, the lower half of the embankment will be seen to consist of round bullets of clay of sufficient hardness to resist being squeezed into one mass by the weight of the embankment, until, in the course of time, from the effects of moisture, they become gradually disintegrated, and a settlement or sinking of the embankment takes place, sometimes to the extent of a twelfth, or even a tenth of the height. The greatest sinking usually occurs during the first wet weather after the formation of the embankment; but it sometimes goes on, though more and more slowly, for years. In the case of railway embankments, this subsidence is seldom of very material importance. If the permanent rails are laid, the labor and expense of restoring them to the level is not great, and the embankment should always be formed sufficiently wide at the top to allow of filling it up to its proper level without adding to the slopes. It is, however, practicable, though rather hazardous, to widen it at the top afterwards by cutting trenches in the slopes.

When the side-slope of the ground on which an embankment is to be formed is very steep, the whole work has a tendency to slip laterally; and to prevent this, trenches or steps are cut in the ground before putting in the embankment. When the material is very wet, it sometimes is impossible to prevent the slopes from bulging out, in which case it is generally sufficient to put in additional stuff until the work stands.

Embankments, when finished, have their side-slopes usually covered with soil and sown with grass-seed; this not only improves their appearance, but adds considerably to their stability, preventing rain and wind from doing the damage that might otherwise take place.

In regard to embankments to restrain or prevent the encroachment of water, it is necessary, in addition to forming them of sufficient height and strength, to cover the surface of the slopes in such a way that the action of the water will not affect it. Of course the method adopted must depend entirely on the nature of the case; where, for example, the water only occasionally touches the embankment, as in the case of river-floods, and does not run with great violence along it, good turf pinned to the slopes has been found effectual. Where, however, the slopes are subject to the action of waves or rapid water, more effectual and expensive measures must be adopted, such as stone-pitching, piling, etc. Embankments of this nature are used on a great scale in Holland. See DYKE.

Embankments for damming up water so as to form ponds or reservoirs, require, in addition to the other conditions, to be perfectly water-tight; and for this purpose a "puddle-wall" of clay is carried from top to bottom in the heart of the structure. The great difficulty lies in preventing the water from finding its way between the bottom of the puddle-wall and the foundation on which it rests, or even through the substances of which that foundation consists; and the wall must often be carried to a great depth below the surface of the ground until an impermeable stratum be found. A knowledge of the geology of the place is here essential to the engineer.

EMBARGO (from the Spanish *embargar*, to in-bar, to arrest), is a public order directing the detention in port of vessels, whether foreign or national. It may be for the purpose of using them for some naval operation, or in the event of some projected expedition to insure secrecy, or with a view to temporary non-intercourse with some foreign nation, or by way of reprisals. A hostile embargo by one nation prohibits the departure from its ports of vessels belonging to another with which it is at variance, for the purpose of securing a favorable settlement of the dispute, and in case of war of having an opportunity to make reprisals. While such a prohibition is held to be an established usage, the practice is generally disapproved. A civil embargo aims at non-intercourse, and is laid pursuant to plans of public policy, or for the protection of the merchant vessels of a neutral nation against the rules of belligerents. Of this sort was the famous embargo enacted in 1807, on the recommendation of President Jefferson, as a retaliatory measure to the Berlin and Milan decrees of Napoleon and the English orders in council. It ordered all vessels in the ports of the United States to be detained except those sailing under a public commission, or such as were already laden or should sail in ballast. American coasting vessels were required to give heavy bonds that their cargoes should be landed in the United States. This act was repealed in 1809, after causing the greatest distress among our own citizens. Other embargo acts were that of 1812, which was suspended upon declaration of war with England, and that of 1813, which was repealed after it had been in force for four months.

EMBASSY. In a popular sense, all diplomatic missions are spoken of as embassies; but such is not the technical meaning of the term. In its more limited acceptation, embassy is a mission presided over by an ambassador, as distinguished from a mission or legation intrusted to an envoy, or other inferior diplomatic minister. The United States sends no ambassador to any country, but the highest American diplomatic grade is that of minister plenipotentiary. The only difference between the powers and privileges of the ambassador and the envoy is, that the former represents the person of his sovereign, and in this capacity he can demand a private audience of the sovereign to whom he is accredited; whilst the latter must address himself to the minister for foreign affairs. A residence is provided for the ambassador, and an allowance for house-rent is made to inferior ministers, in addition to their salaries. See AMBASSADOR, ENVOY, CONSUL.

EMBATERION, a war-song of the Spartans, accompanied by flutes, which they sung marching in time, and rushing on the enemy. The origin of the E. is lost in antiquity.

EMBATTLED, or **IMBATTLED**, called also *crenellé*, one of the partition lines in heraldry, traced in the form of the battlements of a castle or tower. A bordure embattled is often given as a difference to any member of a family who is, or has been, a soldier.

EMBATTLEMENT. See **BATTLEMENT**.

EMBER or **EMBERING DAYS**. According to the *Book of Common Prayer* of the Church of England, three days are appointed four times in the year to be observed as days of fasting and abstinence; these days are the Wednesday, Friday, and Saturday after the first Sunday in Lent, after the feast of Pentecost, after the 14th Sept., and after the 13th Dec. The term "embering" has been variously derived from the Greek *ημεραι*, and from the embers or ashes which in the earliest times were strewed over the head at times of fasting, in token of humility and self-condemnation. But the more correct derivation would appear to be from the Saxon *Ymbrine dagas*, from the Saxon *ymb*, about, and *ryne*, a course or running, the term applied to these fasts because they came round at certain set seasons in the year.—Somner, *Dictionarium Saxonici*. This phrase is used in the laws of Alfred the great, and also of Canute, and corresponds with the term used by the canonists, *jejunia quatuor temporum*, the fasts of the four seasons. Mr. Somner says that the embering days were "times of old chosen and set apart for fasting and prayer for obeyning the fruits of the earth, and to give thanks for the same, whereas at those times they are either sowen, sprung up, coming in their ripenesse, or gathered into the barne, as also to obtaine the grace of the Holy Ghost, when holy orders are given and ministers made." It is to this latter purpose that the Church of England in the present day particularly devotes the ember days, and a special prayer is appointed for use at those seasons.

EMBERIZA and **EMBERIZIDÆ**. See **BUNTING**.

EMBEZZLEMENT. The fraudulent appropriation of personal property held in some fiduciary capacity, as that of agent, clerk, or servant. It is a statutory offense. The crime of larceny, which was the common law wrong most nearly resembling it, is feloniously *taking* and carrying away the personal property of another. Larceny cannot be committed without a trespass, by which is meant, in this connection, an *unlawful taking*. It requires that the property stolen should have been, either actually or constructively, in the possession of the owner. When, therefore, a servant, clerk, or other fiduciary, wrongfully took for his own use articles belonging to his employer which had never come into the employer's actual or constructive possession, the common law did not recognize the act as a crime, but only as a breach of trust, for which a civil action could be brought. Thus, if a clerk employed to collect money placed it in his employer's drawer and subsequently abstracted it with intent to steal, the act was larceny, since the property had come constructively into the possession of the owner. But if, instead of depositing it in owner's drawer, he immediately upon receiving it wrongfully applied it to his own use, he could not be criminally punished for the act. Such infractions of right as these are recognized as wrongs by the civil law, and an action for reparation is provided. The defect in the common law led to the enactment of a statute in the year 1799 (39 Geo. III., ch. 85), declaring such an act in breach of trust to be a felony, and naming the offense embezzlement. This statute has been repealed; but it was substantially re-enacted by the act 8, Geo. IV., ch. 29, and subsequently by 24 and 25 Vict., ch. 96, § 68, which is the law now in force.

The American statutes upon this subject are based chiefly upon that of 8 Geo. IV. In addition to the provision that the article taken should not have been in the possession of the employer, that act required, in order to sustain a charge of embezzlement: 1. That the accused should be a clerk or servant, or a person acting in such a capacity. 2. That the property should have come into his possession "by virtue of his employment." 3. That he fraudulently converted, or appropriated, or secreted it for his own use, without the consent or concurrence of his employer, and with intent to steal it or to convert it to his own use. Although that act confined the crime to servants, clerks and persons employed in such capacity, yet the laws are now broad enough in scope, both in England and in many of the United States, to include wrongs of this nature committed by such persons as agents, attorneys, factors, brokers, public officers, trustees of charities, directors and officers of corporations, etc. If, however, the relation of debtor and creditor simply exist between the owner of the articles appropriated and the person who appropriates them, so that he who receives them may, if he choose, regard them as his own, and thus make himself liable to respond to his employer for their value, the act will not be an embezzlement. For example, if a person employed to procure applications for insurance, receives various sums as premiums, and wrongfully applies them to his own use, he is not indictable for embezzlement. If the property come into the possession of the wrongdoer in any other manner than "by virtue of his employment," his retention of it cannot constitute embezzlement. The essential element, in this respect, is that *some confidence shall be violated*. Thus, if a servant, believing himself authorized to receive money for his master, but not being in fact so authorized, receive it and convert it to his own use, he does not commit the

offense. But if he were in fact authorized by his master, it would be no defense for him that the latter was not entitled to receive the money. By the statutes of some American states, it is not necessary, in order to constitute this crime, that the property belong to the employer, so long as it does not belong to the servant or clerk, and is acquired by the wrongdoer by virtue of his employment. But in England it is requisite that the property belong to the employer.

If a person commit the *act* of embezzlement, the presumption is that he meant to embezzle. Still there must be a criminal intent; and if it be proved that the accused honestly believed himself entitled to the property entrusted to him, however much mistaken he may have been, he cannot be convicted of the crime.

In England, one indicted for larceny may now be convicted of embezzlement, if that crime only be proved, and *vice versa*. In some American states, as New York, larceny has been made broad enough to include embezzlement. The punishment prescribed for embezzlement is usually imprisonment for a term of years. Thus, in England, it is imprisonment at hard labor for not less than three nor more than fourteen years.

EMBLA, in Norse mythology, the first woman created. When the gods Odin, Hœnir, and Lodur left their home to wander on the earth, they found Ask and Embla (ash and elm) without power and without destiny; spirits they had not, nor sense, nor blood, nor power of motion, nor fair color. Odin gave them spirit, Hœnir sense, and Lodur blood and fair color. Some have it the gods were Odin, Veli, and Ve. The man they called Ask and the woman Embla. From this pair the human race descended; a dwelling was assigned to them in Midgard (the earth).

EMBLEM, a representation of an object intended to signify or indicate to the understanding something else than that which it directly represents to the eye. The meaning of the *E.* rests upon its secondary, not its primary signification. *E.* is often used in a sense synonymous with symbol, under which, as the wider word, it will be more convenient to treat it.

EMBLEMATA (Gr.), the works of art with which gold and silver vessels were decorated by the ancients. These sculptured figures were generally executed either in the precious metals or in amber. They were called *crustæ* by the Romans, though the Greek word was also used.

EMBLEMENTS (Fr. *emblaver*, to sow with *blé* or wheat), growing crops of cereal and vegetable productions raised by the labor of the cultivator. Fruits of trees growing on the land, and grass, are not emblements. The law has ever been mindful of the interests of the tenant who has expended his toil and capital in tilling the ground. By the feudal law, when a tenant for life died between Mar. and Aug., his heirs were entitled to the profits for the whole year. By the existing law of England, a tenant for life, or other tenant, whose term may be suddenly and unexpectedly brought to a close, is entitled to reap the crop which he has sown, and to enter the lands after expiry of the term to remove the emblements. By 14 and 15 Vict. c. 25, a tenant at rack-rent (q.v.) under tenant for life is entitled, where the tenancy determines by death of tenant for life, to hold the land till the expiry of the current year. But if a term be brought to an end by the act of the tenant, he is not entitled to emblements. Thus, a tenant for life, who commits forfeiture, or a widow entitled to dower—who, as regards dower-lands, is considered tenant for life—marrying again, are not entitled to emblements. On the death of a tenant, the executor, and not the heir, is entitled to the emblements. By 11 Geo. II., c. 19, *E.* may be distrained for rent, and by common law they may be taken in execution. The right of life-renters in Scotland to reap the growing crop is somewhat similar to the English right to emblements. See **LIFE-RENT**.

EMBLICA, a genus of plants of the natural order *euphorbiaceæ*, having a fleshy fruit. *E. officinalis* is a tree found in most parts of India, with a crooked stem, thinly scattered spreading branches, long narrow leaves, minute greenish flowers, and a globular fruit about the size of a gall-nut. The fruit is very acid, and somewhat astringent, which qualities it retains when dry and shriveled. It is used in India as a deobstruent and febrifuge, also for tanning leather, and making ink, and is generally called *emblic myrobalans*.

EMBOLISM (derived from the Greek word *embolon*, a plug) is the term employed by recent pathologists to designate the plugging-up of a vessel by a clot of coagulated blood-fibrin, by a detached shred of a morbid growth from a diseased cardiac valve, etc. It is in cases of ill-nourished, broken-down constitutions, or after a protracted or a debilitating illness, that the morbid tendency of the fibrin to coagulate spontaneously within the veins chiefly exists, and in such cases very trivial circumstances may call it forth, especially if they lead to any pressure on the vessel. Clots, or portions of a clot, may be transported by the blood-current from the venous system to the right side of the heart, and block up the pulmonary artery either entirely or in part; if the occlusion is entire, sudden death is produced; while, if it is only partial, gangrene, or inflammation of a part of the lung, commonly ensues. Many of the sudden deaths of women in child-bed (till recently quite inexplicable) are due to this cause, the plug being formed in the inflamed uterine veins, or possibly, in some cases, in the right side of the heart, and passing from thence to the spot where its arrest proves suddenly fatal. Several cases

of this kind are reported in Simpson's *Obstetric Memoirs*. Similar accidents may happen in the arterial system. A detached fragment of a diseased tricuspid or aortic valve of the heart, or a separated fragment of coagulated fibrin, may be driven onwards in the blood-current, and enter and occlude some of the cerebral arteries, causing softness of the brain, by cutting off the due supply of nourishment. For further details, the reader is referred to an exhaustive treatise on this subject published a few years ago by Cohn, entitled *Ueber embolischen Krankheiten*.

EMBOSSING, the art of producing raised figures upon various substances, such as paper, leather, wood, metals, etc. This is usually effected by pressing the substance into a die, the kind of die and mode of applying the pressure being modified according to the nature of the design and the properties of the substance to be embossed. Sheet-metal is embossed by stamping it between a pair of steel dies, one in relief, the other in intaglio. See **DIE-SINKING**. When the pattern is a deep one, several pair of dies are used, and several blows given with each, the metal being occasionally annealed. The first stamping produces a crude resemblance to the final design, of moderate depth; successive stampings bringing up more of the details, and giving increased depth. The upper die is usually raised by a rope attached over a pulley to a stirrup, in which the workman places his foot; he draws his foot down to raise the heavy die to the required height, and then suddenly releases the pressure of his foot from the stirrup, when the die descends by its own weight. While thus raising the die with his foot, he adjusts the work in its place with his hands. Smaller work is embossed with a screw-press, the lever of which is turned with one hand, while the work is placed under the dies and removed by the other. Paper and card are embossed in a similar manner, but the dies are frequently of brass, sometimes of copper electro-deposits, suitably backed. The counter-die is commonly made of soft metal, card or mill board, pressed into the metal intaglio die until a sharp impression is produced. The paper or card is well damped, and a fly-press is generally used. The leather or cloth for bookbinding is embossed in this manner, the counter-die being usually made by gluing several pieces of mill board together, and gluing them to the upper bed of the press, then stamping these into the lower die until a perfect impression is obtained. The embossing press designed and constructed by Mr. Edwin Hill, for impressing the medalion upon postage envelopes, is a very elaborate and beautiful machine, which inks the die itself, and with the aid of two boys, to place and remove the envelopes, embosses sixty envelopes in a minute. When large surfaces of textile fabrics, such as table-covers, etc., have to be embossed, the fabric is compressed between rollers, one being of metal, upon which the device is sunk like a die; the counter-roller or bed-cylinder is of paper covered with felt; this yields sufficiently to allow the fabric to be pressed into the die-cylinder. A third smooth metal roller is commonly used to press out again the impression made upon the bed-cylinder; this acts upon the bed-cylinder on the side from which the fabric emerges. Paper is sometimes embossed in this manner; and the flattening roller may be dispensed with if the cylinders are sufficiently accurate in their diameters for the pattern always to fall on the same place at each successive revolution. Leather embossed in high relief has been used for ornamental purposes in place of wood-carving, on picture-frames, cabinet-work, etc. The dies are of type-metal or electro-deposits, and the leather is softened or felled, i.e., worked with water till it contracts and thickens, then it is pressed into the dies by suitable round pointed tools, like modeling tools, made of wood, bone, or copper. When dry, the leather is removed from the molds, and by its elasticity and shrinking it will relieve from very deep and undercut designs.—Mr. Straker's mode of embossing wood differs from all the above, and is very curious and ingenious. When wood is pressed and rubbed with a blunt instrument, the surface yields, and a depression of some depth may be made in it; if the wood be now soaked in water, the depressed portion will rise again to its original level. Mr. Straker takes advantage of this property thus. He rubs down the surface in those parts that are to be finally in relief, he then planes or shaves away the uncompressed portions until the bottom of the depressions are reached and made level with the new surface; the wood is then soaked; the compressed parts rise to their original level, and, of course, in doing so, rise above the portions that have been planed away, and present the required device in relief.

EMBOUCHURE (Fr.), that part of a wind instrument to which the lips are applied to produce the sound, also the manner in which the lips are applied.—The term **EMBOUCHURE** is also applied to the mouth of a river.

EMBOWED, the heraldic term for anything which is bent like a bow. A sinister arm couped at the shoulder, is embowed. When the arm is turned the reverse way, it is said to be counter-embowed.

EMBRA'CERY is, in American law, the offense of influencing jurors by corrupt means to deliver a partial verdict. This offense is a species of maintenance (q.v.). The giving of money to be distributed amongst jurors is embracery, though the money be not actually distributed. Not only persons attempting to influence the jury, but jurors themselves attempting unduly to bias the minds of their fellows, are guilty of embracery. The using indirect means in order to be sworn on a jury, is also embracery. This offense

is punishable by various old statutes. The recognition of the crime of E. is universal in the U. S. The punishment differs in degree according to the various state statutes, but the fact is everywhere recognized that the offense is one which should meet with severe punishment. It is obvious that upon the honesty of the jury depends the just maintenance of law and the due administration of justice. It is not necessary that money be given to constitute E.; improperly influencing is sufficient. This applies to attempts improperly to influence referees as well as jurors.

EMBRA SURES, in fortification, are openings in the parapets, flanks of bastions, and other parts of the defense-works, through which cannon are pointed. The siege-batteries of the enemy have also embrasures. Their use is, to shield as much as possible the guns, gun-carriages, gunners, and interior of the place, and yet leave spaces for the free firing of the guns. Each opening slopes upwards, so as to give a greater sweep to the gun's action. See *illus.*, **FORTIFICATION**, vol. VI.

EMBROCA'TION (Gr. *em*, into, and *brechō*, I wet), the same as liniment (q. v.).

EMBROIDERY, the art of producing ornamental needlework-patterns upon fabrics of any kind. This art is coeval with the earliest and rudest manufacture of hair and woolen fabrics. It was one of the most important of the early arts in oriental countries, where it is still practiced with great skill and diligence. It is common among most savage tribes that wear any kind of clothing. The blanket-wrapper of the red Indian is commonly ornamented with E.; the Laplander embroiders upon the reindeer skin that forms his clothes patterns worked with needles of reindeer bone, and thread of reindeer sinews and strips of hide. It is practiced as a domestic art in our own country by all classes, from the princess down to the pauper school-girl, and is carried on in large manufactories by very elaborate machinery.

The Chinese are perhaps the most laborious and elaborate hand-embroiderers of modern times; their best work is upon silk. The figures are either in colored silk alone, or in silk combined with gold and silver thread; the figures of men, horses, dragons, etc., being outlined with gold cord, and filled up colored and shaded with silk. The Persians, Turks, and Hindus also still excel in E.; they use, besides silk and gold and silver thread, beads, spangles, pearls, and precious stones. The dress-slippers of Turkish women of all ranks are elaborately embroidered, usually with a precious stone or a glass bead in the middle of the toe-part of the slipper, and a radiating pattern in gold, silver, or brass wire and silk surrounding it. The Turkey carpet is a sort of embroidered fabric. See **CARPETS**.

Some of the oriental and Indian embroideries include in their work a great variety of materials besides those above mentioned; feathers are largely and very tastefully used; the skins of insects; the nails, claws, and teeth of various animals; nuts, pieces of fur, skins of serpents, etc., are among these. Coins, which are so commonly used as ornaments for the hair of unmarried women in the east, are sometimes also worked into their dresses with the embroidery. This is especially the case with the Turks and Georgians. The Indian women embroider with their own hair and that of animals.

Tapestry is a kind of E., formerly done with the needle, but now chiefly with the shuttle. This kind of work is, in fact, intermediate between E. and weaving, and it is somewhat difficult to determine under which it should be classed, but in accordance with the definition given above, we shall only include needlework under E., and tapestry will be separately treated.

For hand-embroidery, the fabric is usually stretched upon a frame, and the design to be worked is drawn upon it, or some other contrivance is used to guide the worker. If the fabric is sufficiently thin and open, a colored drawing or engraving may be placed behind the work, and followed with the needle. A sheet of thin transparent paper, with lines upon it corresponding to the threads of the canvas to be worked upon, is sometimes used; this is secured by gum or wax to the drawing; and the design is copied by observing the number of small squares occupied by each color, and filling in the corresponding meshes of the canvas. *Berlin-work*, which is a kind of E., is done in a similar manner, the pattern being an engraving on which the lines corresponding to the thread are printed, and the meshes filled up with the required colors, painted in by hand, by women and children, who copy it from the original design of the artist. The name has been given from the fact, that the best patterns have, since 1810, been published by Wittich, a printseller of Berlin.

In France, pricked patterns are sometimes used, one for each color, and colored powders are dusted through the holes upon the fabric to be worked.

All these devices render the art of E. a mere mechanical operation, requiring no further artistic skill or taste than is exercised in knitting stockings; but when the embroidress draws the design in outline upon the fabric, and works in the colors with her needle under the guidance of her own taste, E. becomes an art that might rank with water-color drawing or oil-painting; and it is to be regretted that so much time should be devoted by ladies to the mechanical, and so little effort made in the direction of truly artistic embroidery.

Machine-embroidery has been practiced with considerable success during the last quarter century. A machine was exhibited in the French industrial exhibition of 1854, by M. Heilmann of Mulhausen, by which one person could guide from 80 to 140 needles.

all working at the same time, and producing so many repetitions of the same design. Although the details of the construction of this machine are rather complex, the principle of its action may be easily understood. The needles have their eyes in the middle, and are pointed at each end, so that they may pass through from one side of the work to the other without being turned. Each needle is worked by two pair of artificial fingers or pincers, one on each side of the work; they grasp and push the needle through from one side to the other. A carriage or frame connected with each series of fingers does the work of the arm, by carrying the fingers to a distance corresponding to the whole length of the thread, as soon as the needle has passed completely through the work. The frame then returns to exactly its original place, and the needles are again passed through to the opposite set of fingers, which act in like manner. If the work were to remain stationary, the needles would thus pass merely backwards and forwards through the same hole, and make no stitch; but by moving the work as this action proceeds, stitches will be made, their length and direction varying with the velocity and the direction in which the work moves. If 140 needles were working, and the fabric were moved in a straight line, 140 rows of stitching would be made; if the work made a circular movement, 140 circles would be embroidered; and so on. In order, then, to produce repetitions of any given design, it is only necessary to move the fabric in directions corresponding to the lines of the design. This is done by connecting the frame on which the work is fixed to an apparatus similar to a common pantagraph, or instrument so constructed that one end repeats on a smaller scale exactly the movements which are given to the other. See PANTAGRAPH. The free end of this is moved over an enlarged copy of the design, the movement being a succession of steps, made after each set of needles has passed through; and thus the work is moved into the position required to receive the next stitch of the pattern.

This machine was subsequently patented in England, and many improvements have been made upon its details, but the principle of its construction remains the same.

Although it is possible to embroider any design with such machines, there are only certain designs that can be worked economically; for to do this, the patterns must be so designed as to consume each needleful of silk without waste. The length of silk required for each color can be calculated with extreme accuracy, and the designer is usually limited by this requirement. A greater range is, however, obtainable by dyeing the same thread of silk in different colors, the length of each color corresponding to what is required for producing the pattern; but a large demand for each pattern is required to render this profitable.

EMBRUN, a t. of France, in the department of Hautes Alpes, is situated on a platform of rock in the midst of a plain, on the right bank of the Durance, 20 m. e. of Gap. Seen from a distance, the town has an imposing appearance. The streets of E. are narrow, dirty, and irregular. It is surrounded by loop-holed ramparts and ditches, and strengthened by bastions. The principal buildings are the cathedral, a Gothic edifice, surmounted by a lofty Romanesque tower, and the barrack, formerly the archbishop's palace. E. manufactures broadcloth, counterpanes, hats, cotton-yarn, and leather. Pop. of commune, '91, 4017.

E. occupies the site of the ancient Ebrodunum, capital of the Caturiges, and an important Roman station. The line of its archbishops can, it is said, be traced to the time of Constantine. In modern times E. has been thrice destroyed by fire: by the Moors in 966, during the religious wars in 1573, and by the duke of Savoy in 1692.

EMBRYO (Gr.), an organized being in a rudimentary condition, or the rudiment from which, under favorable circumstances, an organized body is to be developed. In botany, the term E. is applied to the germ formed within the ovule on fertilization, and which increases to become the principal part of the seed. The albumen or perisperm of the seed, being regarded as a mere store of nourishment for the E., is not accounted part of the E.; the cotyledons, however—although a large store of nourishment is often laid up in them—are considered as essentially belonging to it, along with the *plumule*, the *radicle*, and the connecting parts. As to animals, the term E. is used as equivalent with *fœtus*, and as designating the rudimentary animal from the moment of impregnation until the egg is hatched; but although this takes place at very different stages of development in different kinds of animals, and consequent metamorphoses are undergone by some before they reach their perfect state, the term E. is not applied to the *larvæ* and *pupæ* of insects, or to the analogous states of other classes of animals. Eggs contain, along with the E., a store of nourishment for it in the earlier stages of its development. See REPRODUCTION, DEVELOPMENT OF THE EMBRYO, EGG, FŒTUS, OVULE, SEED, and SPORE.

EMBRYOLOGY. See DEVELOPMENT OF THE EMBRYO.

EMBRYOTOMY, a division of the fœtus into fragments, to extract it by piecemeal, when the narrowness of the pelvis or other faulty conformation opposes delivery.

EMBURY, EMMA CATHERINE, 1806-63; b. New York; daughter of Dr. James R. Manley. She published many poems and prose sketches and tales, among them *Guido and Other Poems*; *Constance Latimer, or the Blind Girl, and other Tales*; *Pictures of Early Life*; *Glimpses of Home Life*; *Nature's Gems, or American Wild Flowers*; *Love's Token Flowers*; *The Waldorf Family*, etc.

EMBURY, PHILIP, b. Ireland, 1729; d. Troy, N. Y., 1775; widely known as the "founder of American Methodism." He was of German descent, and came to America in 1760. In 1766 he organized a society in New York, and the next year began to preach in a rigging loft, which place became famous as the cradle of Methodism in this country. The next year a church was built, on the site of the present old John street church, partly by E.'s own hands. About a year later a company of missionaries sent out by Wesley arrived in New York, and Embury went as a missionary to the region around Albany and Troy. He died suddenly from an accident.

EMDEN, a t. in the province of Hanover, once in the principality of East Friesland, is situated a little below the embouchure of the Ems into Dollart bay, in lat. 53° 22' n., long. 7° 13' east, 40 miles west by south from Wilhelmshaven, and 14 miles southwest of Aurich, with which it is joined by a canal. It lies low, but is protected by strong dykes from any inroad of the waters of the bay. Nevertheless, occasional inundations have taken place; as in 1826, when the water stood up to the first floor of the houses for three months. E., which is the chief commercial town of Hanover, is surrounded by walls and towers, is well built, has spacious and well paved streets, and houses remarkable for their appearance of comfort, and for their extreme cleanliness. It is intersected by numerous canals, which are crossed by many bridges. Communication with the port from the river Ems is afforded by the Nesserland locks, which formerly admitted vessels of 17 ft. draft, but since 1893 great improvements have been made. There is telegraphic communication by cable between Emden and the town of Valentia, Ireland. The principal building, and one of the finest public edifices in the whole region, is the town hall, containing a library and a curious collection of ancient arms and armor. E. stands in a district of great fertility. It has a good deal of shipbuilding, besides various other manufactures. Many of its vessels are engaged in the herring-fishing off Scotland. E. was made a free port in 1751, came into the possession of Holland in 1808, and with the whole of East Friesland, was incorporated with the kingdom of Hanover in 1815. Pop. '90, 13,424.

EMERALD (Sp. *esmeralda*, Fr. *émeraude*, Ger. *smaragd*, Gr. *smaragdos*; the name is originally Semitic, or at least eastern, but the signification unknown), a mineral generally regarded by mineralogists as merely another variety of the same species with the beryl (q.v.), with which it essentially agrees in composition, crystallization, etc., differing in almost nothing but color. The E., which, as a gem, is very highly valued, owes its value chiefly to its extremely beautiful velvety green color. It is composed of about 67 to 68 per cent. of silica, 15 to 18 of alumina, 12 to 14 of glucina, and a very little peroxide of iron, lime, and oxide of chromium. Its color is ascribed chiefly to the oxide of chromium which it contains. Its specific gravity is 2.577 to 2.725. In hardness it is rather inferior to topaz. The localities in which E. is found are very few. The finest have long been brought from South America, where they are obtained from veins traversing clay-slate, hornblende slate, and granite, in a valley not far from Santa Fé de Bogota, Colombia, at a place called Muzo. One stone found at Muzo in 1884 weighed in the rough more than a pound, and is believed to be the largest ever discovered. In several localities in Alexander county, N. Carolina, emerald varieties of beryl are frequently found. Emeralds of inferior quality are found in Europe, imbedded in mica-slate in the Henbach Valley in Salzburg. They are also found in the Ural; and some old mines in Upper Egypt have also been discovered to yield them, from which, probably, the ancients obtained them. This gem, known from very early times, was highly prized by the ancients. Pliny states that when Lucullus landed at Alexandria, Ptolemy offered him an E. set in gold, with his portrait engraven on it. Many wrought emeralds have been found in the ruins of Thebes. Nero, who was near-sighted, looked at the combats of gladiators through an eye-glass of E., and concave eye-glasses of E. seem to have been particularly esteemed among the ancients. As a precious stone, the E. is rarely without flaw. Its value also depends much on its color. A very perfect E. of six carats has been sold for \$5000.

It appears not improbable that emeralds have been found in the east, in localities not at present known, but the name E. or ORIENTAL E. is often given to a very rare, beautiful, and precious green variety of sapphire (q.v.).

E. COPPER is a beautiful and very rare E. green crystallized mineral, also called DIOP-TASE, found only in the Kirghis Steppe, and composed of about 39 parts silica, 50 prot-oxide of copper, and 11 water.

EMERALD BIRD OF PARADISE, a native of New Guinea, and one of the most beautiful of its order. The skins and feathers are highly prized for ornament, and bring large prices.

EMERALD ISLE, a popular name for Ireland (q.v.).

EMERALD WEDDING. See WEDDING ANNIVERSARIES.

EMERITUS (Latin *emeriti*, to serve out, to complete one's term of service), a term originally applied to a Roman soldier who had *served out* his time, and had been honorably discharged, receiving an allowance corresponding somewhat to the modern half-pay, given to soldiers who retire after honorable service. The term *emeritus* is now employed to designate certain functionaries, such as professors and rectors, who have been honorably relieved from active labors by reason of age, infirmity, or long and faithful service.

EMERODS (Gk. *hæmorrhoids*, a pile). This is a corruption of the word hemorrhoids, and in the Bible text (see I. Sam. v. 12) refers to a disease similar to the modern disease called piles (q.v.).

EMER'SION, the reappearance of one heavenly body from behind another, after an eclipse or occultation. The immersions and emersions of Jupiter's first satellite are particularly useful for finding the longitude of places. Minutes or scruples of emersion are the arc of the moon's orbit passed over by her centre, from the time she begins to emerge from the earth's shadow to the end of the eclipse.

EMERSON, GEORGE BARRELL, LL.D., b. Maine, 1797; graduate of Harvard, where he was afterwards tutor in mathematics and natural philosophy. He was a popular teacher in Boston until his retirement from professional life in 1855. He published a second part to *School and Schoolmaster*; *A Manual of Architecture*; *Report on the Trees and Shrubs growing naturally in the forests of Massachusetts*, etc. He served as president of the Boston society of natural history, and as chairman for the commission for the zoological and botanical survey of the state. He d. in 1881.

EMERSON, RALPH WALDO, LL. D., an eminent American poet and essayist, was born in Boston, May 25, 1803. He was of clerical lineage, being the eighth in succession of a consecutive line of Puritan ministers. His father, who died when he was but seven years of age, was the Rev. William Emerson of the First church in Boston. He was fitted for college in the Boston public Latin school, entered Harvard in 1817, and graduated in 1821. His tastes were literary rather than scholastic. In the Latin school he wrote verses for exhibition days, and in college the library had for him more charms than the text-books. His rank as a student was not above that of some others in his class, though he took two prizes for dissertations and one for declamation, and was the class-day poet at the time of his graduation. For five years after leaving college he was engaged with his brother William in teaching a successful school for girls in Boston. During this time he must have given attention to theological studies, for he was "appropriated to preach" in 1826. After this, for the benefit of his health, he passed a winter in South Carolina and Florida. In Mar., 1829 he was ordained as colleague of the Rev. Henry Ware in the Second Unitarian church in Boston. His pastorate was short, for he soon found himself entertaining scruples concerning the ordinances of the church, and especially unwilling to administer that of the Lord's Supper. His resignation of his pulpit and of the ministry for such a reason made no little stir in the Unitarian denomination, and in the other Christian sects, being regarded as a very strange event. The parting between him and his congregation, in 1832, was most honorable and affectionate on both sides, for, as a preacher, he had won popularity and favor. He now went to Europe for a year, and on his return, in the winter of 1833-34, he began in Boston his eminent career as a lecturer, with a discourse upon "Water," before the Boston manufacturers' institute. Three other lectures, two upon "Italy," and one on "The Relation of Man to the Globe," were delivered during the same season. Shortly after this he delivered in Boston a course of biographical lectures on Michael Angelo, Milton, Luther, George Fox, and Edmund Burke; the first two of which appeared afterwards in the *North American Review*. After that day, and as long as he lived, Mr. Emerson was among the most conspicuous and popular of American lecturers, traveling extensively in the eastern, northern, and western states, and attracting large audiences, less by any oratorical gifts than by the solid value of his thoughts. In some places he remained a great favorite, speaking by invitation for the fortieth or fiftieth time in the same lyceum course, with undiminished interest. In 1835, Emerson took up his residence in Concord, Mass., where he was esteemed the foremost citizen in the place, sharing the love, honor, and reverence of all the people, without distinction of party or sect. In 1835, and the three or four following years, he delivered in Boston successive courses of lectures on English literature, the philosophy of history, human culture, human life, and the times. In 1834, he delivered a poem before the Phi Beta Kappa society of Harvard; in 1837, an oration before the same society upon "The American Scholar;" and in 1838, an address to the senior class of the Cambridge divinity school, which created no little stir in the literary and theological world. His first book, a thin volume entitled *Nature*, appeared in 1836, and was received by a few enthusiastic admirers as opening a new era in American thought, while in some quarters it was sharply criticised. In 1841, appeared *The Method of Nature*, which developed more fully the peculiar qualities of his mind and his ways of thinking, and by its freshness and beauty won him many admirers. For reasons which to many leaders of popular thought were incomprehensible, he was rapidly gaining a strong hold upon the affection and reverence of an increasing multitude of his countrymen, and winning the attention of thoughtful men on the other side of the Atlantic. The "transcendental" movement, so called, was coincident with the appearance of his earliest works, and received from them both impulse and direction. In 1840, appeared a quarterly magazine entitled *The Dial*, with Miss Margaret Fuller as editor, assisted by A. Bronson Alcott, William E. Channing, Emerson, Theodore Parker, George Ripley, and others. This periodical was continued four years, during the last two of which Emerson was the editor. Two volumes of *Essays* were Emerson's next issues, the first appearing in 1841, the second in 1844. His collected *Poems* were published in 1846. In 1847, he visited England to fulfill engagements as a

lecturer, and was warmly received by the lovers of his books, and by the public generally. In 1849, he collected into a volume of *Miscellanies* his "Nature," and nine lectures and college addresses, which had previously appeared in *The Dial*, or in pamphlet form. In 1850, appeared his *Essays on Representative Men*, a work of great interest and power. In 1852, he assisted in preparing the memoirs of Margaret Fuller Ossoli. In 1856, he published *English Traits*, a work which well illustrated his powers of accurate observation, and his clear understanding of the workings of human nature under various conditions. Next appeared, in 1860, *The Conduct of Life*, a work which brings clearly to view the exalted moral and ethical principles which underlie and pervade all that he has written. A subsequent volume embraced a portion of his contributions to the *Atlantic Monthly*. In 1867, appeared a volume of his poems, *May Day and Other Pieces*. In 1870, he published *Society and Solitude*, and in 1869, appeared his *Prose Works Complete*. In 1875, he published four series of *Essays*. In 1878, in the *North American Review*, appeared a paper, *Sovereignty of Ethics*, which fixed the public attention as the ripest fruit of his broad culture; and in 1880, the *Unitarian Review* published, under the title of "The Preacher," his address of 1879 in the divinity chapel at Cambridge. In 1878, he spoke on "The Fortune of the Republic," in the Old South Church; and, 1880 (for the hundredth time), in Concord, on "New England Life and Letters." In the midst of his literary labors Emerson always had time to manifest his interest in great public questions as they arose. Some of his letters upon passing events in the newspaper press have exerted a wide influence. While he was a pastor in Boston he opened his pulpit to an earnest protest against American slavery, and during the whole period of the antislavery agitation he constantly manifested his sympathy with those who sought to deliver the land from the curse of human bondage. In 1844, he gave emphatic expression to his views in an address delivered upon the 1st of Aug., the anniversary of emancipation in the British West Indies. Though not in the technical sense of the word a reformer, his habits and tastes being rather those of a scholar and man of letters, every earnest movement for the welfare of humanity secured his sympathy. He gave his name to the call issued in 1850 for the first convention ever held in Massachusetts to secure for women equal rights with men as citizens and voters. He was member of the American academy of arts and sciences, of the American philosophical society, of the Massachusetts historical society, and a vice-president of the free religious association. He was also a member of the board of overseers of Harvard university, from which he received the degree of doctor of laws in 1866. His writings, though marked by an ethical and spiritual vitality of the highest order, are utterly devoid of system, and pervaded by a certain mystical quality, charming to some but bewildering to others. His intellectual gems are profusely sown throughout his pages according to no visible or conscious method, and with settings that seem quite accidental; but they glow with a genuine luster wherever found. To the arts and processes of the logician he pays no regard, evidently thinking that they tend to belittle, rather than exalt, the truth. He simply affirms what he believes, making his appeal at every step to the moral intuitions of the reader, in the faith that the "spirit of man is the candle of the Lord," with a power of illumination adapted to every emergency. His position is clearly indicated in a simple sentence from his address at the divinity school in 1838: "The assumption that the age of inspiration is past, that the Bible is closed, the fear of degrading the character of Jesus by representing him as a man, indicate with sufficient clearness the falsehood of our theology." His earlier writings are supposed by some to show a drift towards pantheism, but others repel this interpretation as unjust. Certainly he had never called himself a pantheist, and there is unquestionable evidence that whatever may have been his former speculations, that name could never truly be applied to him. His friend A. Bronson Alcott reports him as saying: "I do not care to classify myself with any painstaking accuracy with this sect or with that; but if I am to have any appellation at all of a religious kind, I prefer to be called a Christian theist. You must not leave out the word Christian, for to leave out that is to leave out everything." Confirmation of this is to be found in his latest publication, *The Preacher*, in which he says: "Unlovely, nay, frightful, is the solitude of the soul which is without God in the world. To see men pursuing in faith their varied action, warm-hearted, providing for their children, loving their friends, performing their promises—what are they to this chill, houseless, fatherless, aimless Cain, the man who hears only the sound of his own footsteps in God's resplendent creation?" Emerson died at Concord, April 27, 1882. See Ireland, *Ralph Waldo Emerson, a Biographical Sketch* (Lond., 1882); Conway, *Emerson at Home and Abroad* (1882); Cooke, *Ralph Waldo Emerson; Life, Writings and Philosophy* (Boston, 1882); O. W. Holmes, *Ralph Waldo Emerson* (Boston, 1885); Cabot, *A Memoir of Ralph Waldo Emerson* (Boston and N. Y., 1887), the standard authority; Montégut, *Essais de Philosophie Américaine* (1851); the complete works edited by Cabot (11 vols., Boston), and the English edition with introductory essay by Morley (Lond., 1882).

EMERY (Fr. *éméril*, Ger. *schmergel*, Gr. *smiris*; allied to *smear*), a variety of corundum (q.v.), or of the same mineral species of which corundum and sapphire (with oriental ruby, etc.) are also varieties. It agrees with them very perfectly in composition, hardness, and specific gravity; but is dull, opaque, and not crystallized, sometimes of a grayish black, and sometimes of a blue color. It occurs both massive and disseminated. Its masses, although very compact, have a somewhat granular structure. It is found in several parts of Europe, in Asia Minor, Greenland, etc., generally in masses scattered

through aqueous deposits, but in one locality in Saxony in beds of steatite in a schistose rock. The E. of commerce is chiefly obtained from the island of Naxos. Being very hard, it is much used for grinding glass and polishing metals and other hard substances. It is found in lumps, having a granular structure. It is composed of alumina, oxide of iron, and silica, with a little lime, in proportions varying considerably with different specimens. The following may be taken as an average: alumina, 82; oxide of iron, 10; silica, 6; lime, 1½.

It is prepared for use by first breaking it into lumps about the size of a hen's egg, then crushing these to powder by stampers. It is then sifted to various degrees of fineness, which are numbered according to the meshes of the sieve. Plate-glass manufacturers and others separate E. powder into different degrees of fineness by the method of *elutriation* (q.v.). A number of copper cylinders of graduated capacities are placed in a row, and filled with water; the E., churned up with an abundance of water, is admitted by a pipe into the smallest, it then passes to the next in size, and finally flows from the largest; and thus, as a given quantity of water with E. suspended in it, passes in equal times through vessels of varying capacities, the amount of agitation will obviously be greatest in the smallest vessel, least in the largest, and in like proportion with the intermediate; the largest particles, therefore, sink in the smaller vessel, and so on till only the very finest will reach the largest vessel. In this manner, any number of gradations of fineness may be obtained, according to the number and sizes of the vessels. Elutriation in oil or gum-water is sometimes used on a smaller scale, the E. being stirred up in the liquid, and portions poured off at different intervals of time, the finest being, of course, the last to settle. The use of the oil or gum is to make the subsidence take place more slowly.

E. thus prepared is used for a great many important purposes in the arts. Being next in hardness to diamond-dust and crystalline corundum, the lapidary uses it for cutting and polishing many kinds of stone. Glass-stoppers of all kinds are ground into their fittings with it. Plate-glass is ground flat by its means; it is also used in glass-cutting, and in grinding some kinds of metallic fittings. When employed for the polishing of metals, it has to be spread on some kind of surface to form a sort of fine file. *E. paper*, *E. cloth*, *E. sticks*, *E. cake*, and *E. stone*, are various contrivances for such purposes.

E. paper is made by sifting E. over paper which has been covered with a coating of glue. It is used either by wrapping it round a fine file, or a stick, or in the hand, according to the form of the work. See POLISHING OF METALS.

E. cloth is made like E. paper, with coarse calico substituted for the paper. The E. does not adhere so well as to paper, and it is therefore not used by metal-workers, who work E. paper till smooth with wear, but is chiefly used for purposes where the hand alone is used, and paper would tear.

E. sticks are used for the same purposes as E. paper wrapped round files; they are made of deal sticks shaped like files, then glued over, and dipped once or twice in a heap of emery.

E. stone is a kind of earthenware mixed with E., formed by pressing a mixture of clay and E. into suitable molds, and then firing, like common earthenware. It is molded into wheels, laps, etc. Its hardness and cutting power are very considerable.

EMERY, a co. in Utah; formed 1880. 5723 sq. m.; pop. '90, 4866. Co. seat, Castledale.

EMESA. See HEMS, or HOMS.

EMETICS, medicines given for the purpose of producing vomiting (q.v.). They are given when it is desirable to relieve the stomach of some noxious or indigestible substance, as a narcotic poison, or excess of food, or some special article of diet which has disagreed. E. are also administered in cases of fever, where the copious secretion they produce from the glands of the stomach and intestines is supposed to have a directly curative effect, aided, perhaps, by the sedative action of E. upon the circulation and nervous system. There is a considerable amount of evidence to show, that E. have the power of cutting short typhus and other fevers in the earliest stage, and afterwards of making the attack of the disease less severe. In diseases of the respiratory organs, E. are given as the quickest and safest method of removing accumulated mucus from the air-passages; and in croup (q.v.), their action is especially favorable, being often followed by expectoration and a rapid improvement in the suffocative symptoms. E. are to be given with great caution, however, in all very depressed states of the system, as their primary action is to produce nausea (q.v.), which is attended always with more or less diminution of the vital power, and often with great depression of the heart's action, amounting to syncope or fainting. The principal E. are the preparations of antimony, zinc, and copper; ipecacuanha in powder or in wine; squill, lobelia, and, generally speaking, the whole class of expectorants and irritants; the latter of which, however, with the exception of sulphate of zinc, and perhaps mustard and water, form a dangerous kind of E., which should never be administered when the milder kinds can be procured.

EMETINE is the alkaloid which forms the active principle of ipecacuanha root. It is a yellowish-white powder, which is slightly soluble in cold water, but dissolves readily in alcohol. When taken internally, it exhibits violent emetic properties, ʒ of a grain being sufficient to cause vomiting. See IPECACUANHA.

EMIGRATION AND IMMIGRATION. Emigration is the passing out of any part of the world by one who means to settle permanently elsewhere. Immigration is the passing into the new country where he proposes to make his home. Thus every *emigrant* is at the same time an *immigrant*—an emigrant with respect to his old home; an immigrant with respect to his new.

Emigration is as old as history itself, and has exercised a most important influence upon the history of the human race. A great wave of emigration from the East populated Europe with tribes of the Aryan race. Emigration from Greece, prompted by the constant political struggles there, led to the planting of numerous Greek colonies in southern Italy and Asia Minor, and even as far west as Massilia (Marseilles), in what is now France.

The Romans, too, were great colonizers, but by conquest rather than by emigration. They disliked leaving Italy; and the military and civil officers necessary to rule a colony were generally the only Romans who abode in it. These, even, did not, in general, settle in the colonies with their families, but were recalled after a certain period of service, the whole arrangement much resembling that for the government of British India.

The migrations of the northern tribes who overran the Roman empire are well known in history; their wanderings may be said, indeed, to have continued down to the thirteenth century. Those who wandered from the north into France, where they acquired great territories, became known as Normans, and were remarkable for entirely throwing off the language and manners, and even all the traditions of their original homes, and becoming the most civilized and courtly portion of the French people. But though thus changed, they still continued to wander, spreading over Britain, Sicily, and the intervening portions of Europe.

The discovery of America opened a vast new field for E., which was taken immediate advantage of by the Spanish and Portuguese, and later by the British, the French, the Germans, and the Dutch. In the seventeenth century, many of the English Puritans, persecuted in, or discontented with, their own country, found it more congenial to their tastes to live together in a new country, where they would be free from the presence of those who did not sympathize with them, and they thus founded the New England colonies. It is singular that, in the nineteenth century, an attempt should be made to revive the plan of emigrating for the purpose of maintaining an exclusive church, as, for instance, in the English high-church colony of Canterbury, and the Scotch free-church colony of Otago.

The great fields for emigration to-day are the United States, Canada, Brazil, and the Argentine Republic; Australia, Cape Colony in South Africa; the newly established (1886) German colonies in East Africa; and also the Congo Free State (q.v.).

Emigration from Europe.—Since 1820, the stream of emigration from Europe to other parts of the world has been steadily increasing in volume. The hard conditions of life there, the keen competition in every sphere of industry, the over-population, and the crushing burdens imposed by the enormous military establishments, have proved the greatest stimulus to emigration. Great Britain for years led all other countries in the numbers that she has sent forth. In 1815 there left her shores 2081; in 1817, 20,634; in 1819, 34,787; in 1832, 103,140, this being a year of great financial depression. From 1832-45, the annual average was 75,000; in 1852 the number rose to 368,764. In 1890 it was 122,085. German emigration is next in importance to British, and grew steadily up to 1854. In 1830 it was about 22,000; in 1847, 110,434; in 1854, 251,931. It has never since reached so large a figure. In 1889 it was 96,032, and of late years has averaged about 100,000 per annum. Italy in the last decade has taken the second place in point of numbers. In 1876 there were 19,000 Italian emigrants; in 1879, 40,000; in 1887, 127,748, and in 1889, 218,412. Next comes Sweden with 75,561, in 1888; Austria and Hungary, with 48,567; Russia with 43,000; Norway with 21,452; and Denmark with 8659. In 1888 out of every 1000 inhabitants there migrated from Italy, 6.87; from Great Britain and Ireland, 7.46; from Germany, 2.10; from Sweden, 9.36; from Norway, 10.58. Hence proportionally to the population, the drain by emigration is greatest in the case of Norway. Emigration does not, however, threaten to deplete the population of Europe. Europe has never exhibited so rapid a growth of population as in the present century; and while Ireland, for instance, has since 1851 lost 71 per cent. of the average population, Ireland is still an over-populated country. The objection to emigration entertained by the governments of Europe is rather due to the fact, as Prof. J. Thorold Rogers declares, that emigration drains a country of its most vigorous, independent, and thrifty laborers—in fact, of the cream of its working population, while those that remain behind are more apt to be the unenterprising, the dissolute, and the idle.

Immigration into the United States.—The great majority of European emigrants seek the United States. The following figures for 1890 show the proportions to which this influx of foreign-born inhabitants has attained: from Great Britain, 122,085; Germany, 92,427; Italy, 52,003; Sweden, 29,632; Norway, 11,370; Europe not otherwise specified, 112,764; total for 1890, 455,302. The following table shows the comparative figures since 1820:

| Year. | Total Immigrants. | Year. | Total Immigrants. |
|------------|-------------------|------------|-------------------|
| 1820 | 8,385 | 1860 | 150,237 |
| 1830 | 23,322 | 1870 | 887,303 |
| 1840 | 84,066 | 1880 | 457,257 |
| 1850 | 369,986 | 1890 | 455,302 |

From 1820 to 1890 the population of this country was increased by 15,381,009 aliens.

Economic Effects of Immigration.—As in every great social movement, there are in immigration great economic gains to the country receiving it, as well as corresponding economic disadvantages. The remarkable growth of our country in its first century as a nation is very largely due to the constant additions to our laboring population received through immigration. Statistics show that the opening of the West and its agricultural productiveness have been in great measure the work of immigrants. In Minnesota, for example, fully one half of the agricultural population is composed of foreigners. In Michigan, in 1887, of some 90,000 farmers, more than 30,000 were of foreign birth. More than half the mining population of the entire country is alien, and so is a third of our manufacturing population. The children of immigrants, of course, do not appear in this estimate, but they must not be left out of sight. Another economic advantage is found by some in the actual money that most immigrants bring with them. It has been estimated that each immigrant brings on an average the sum of \$68.08; some have fixed the sum as high as \$100 per capita. (See Kapp, *Immigration*.) Taking even the more conservative of these two estimates, it would show a clear addition, for instance, in the year 1890, of some \$30,000,000 to the wealth of this country. It is probable, however, that this is fully offset, if not more than offset, by the remittances made every year to relatives in the old country by those who have made their home here. The statistics on this point are not complete, but it is known that in the year 1886 the sum of \$6,380,156 was thus remitted to Great Britain alone, and this is only a partial return. (See Smith, *Emigration and Immigration*, 1890.) It has also been very acutely remarked that, assuming even that each immigrant brings the larger sum (\$100), still the average well-being of our country is decreased, for the average wealth here is some \$1000 *per capita*, and the arrival of each new immigrant with only \$100 lowers the average. But the economic advantage seems to be clearly greater than the losses, in the case of able-bodied, intelligent, and industrious immigrants; and were all immigrants such, this question and other questions upon which we have to touch would not be raised.

Political Effects of Immigration.—So great an influx into a community like ours of men of foreign birth, training, and ideas, cannot be unaccompanied by serious political consequences, especially as our laws permit naturalization on the easiest possible terms, and after a probation that is often too short to allow the applicant to acquire our language. (See NATURALIZATION.) This is perhaps not unwise as a national policy, provided that immigration be permitted to continue. Any other policy, in fact, would lead to a well-defined class-system—in fact, to a servile system. We should have in the midst of the community a class of aliens bound to our institutions by no ties whatever, and feeling themselves to be a class apart. Of the great dangers of such a state of affairs it is unnecessary to speak. Hence, in the past, immigration has been unrestricted, and citizenship has also been a free gift burdened with scarcely any conditions. The result is a very large proportion of voters of foreign birth—a proportion larger than appears at first sight, because among immigrants there are always more adult males in proportion to their numbers than among a corresponding number of native-born persons. It is estimated that of the native-born white population, 22.4 per cent only are voters; while of the foreign-born white population, at least 46.3 have the suffrage.

This is a very important fact, and its political consequences depend, as do the economic consequences spoken of before, in large measure upon the character and quality of the immigrants who thus qualify themselves to hold the balance of power at all our elections, whether municipal, state, or national. So long as the bulk of the immigration to our shores was from English-speaking countries—from Ireland, Scotland, and England—the assimilation of it to the existing conditions of our civil polity was comparatively easy. A single generation sufficed to obliterate any distinctions between the families of the immigrants and the communities in which they made their home. The political traditions of personal independence and submission to law that they brought with them were the same as those that lie at the base of our own system. But since 1870 the statistics show that the great bulk of immigration has come from countries whose political development has been worked out upon far different lines, and whose subjects, moreover, by reason of their difference in language and social customs, have formed separate communities in which they have so far perpetuated and, if anything, accentuated these differences. Thus the Scandinavians have founded colonies of their own in Minnesota and Michigan; the Germans in Ohio; the Russians and Polish Jews in certain quarters of our great cities. Here they have their own society, their own schools and teachers, and newspapers printed in their own languages. The presence of communities such as this, alien in spirit and in habit of thought from the population surrounding them, is a great impediment to a thorough racial amalgamation, and is a source of weakness, threatening to render homogeneous and harmonious development impossible.

Unfortunately, in the past decade this truly alien immigration has steadily increased. Hungary, Russia, and Italy have sent us greater and greater numbers of their inhabitants with every year. In March, 1891, the Italians landing at the port of New York outnumbered the immigrants of any other nationality. The presence of so large an alien element is made evident in various ways: first, in the increase of those who exercise the suffrage with no true understanding of its real meaning and responsibilities; second, in the serious outbreaks of violence and disorder, such as the murders attributed to the *Maftia* (q. v.) in New Orleans, and the accompanying riot, as well as the outbreaks among the Hungarian miners in Pennsylvania (April, 1891); and, finally, the undoubted existence in our cities of a numerous element inspired here by the same principles and cherishing the same hatred of law and property as are confessed by the Anarchists of Germany, the Nihilists of Russia, and the Communists of France. How dangerous the presence of these agitators may become to a community was made evident by the Anarchist riots in Chicago, in 1886.

Social Effects of Immigration.—It is difficult to estimate with any degree of accuracy the direct social effects of immigration upon our people. The springs and sources of vice and crime are far too complex and too elusive to be mathematically treated. Yet it is quite possible to study tendencies; and so far as the statistics of disease, pauperism, and crime can be taken as evidence, the effects of immigration are distinctly unfavorable. This is, of course, largely due to the fact that the great mass of the immigrants come from the lower classes, and, as a high authority puts it, "it is always true that mortality is greater and crime, vice, pauperism, and illiteracy more prevalent among the lower classes than among the higher. It is only natural to expect, therefore, that the foreign-born will contrast unfavorably with the native population in all these respects, simply because they represent more numerous these lower classes."

Statistics show that about one-fifth of the persons susceptible to insanity are foreign-born; so are one-third of those suffering from chronic diseases, and one-fourth of the blind. In Massachusetts, in 1885, when only 27 per cent. of the entire population was foreign-born, 40 per cent. of the criminals were foreigners. In New York state, in 1887, there were in the country poor-houses 9172 native paupers and 9288 foreign paupers; while in the city poor-houses the native paupers were 18,001 as against 34,167 of foreign birth. Again, in the investigation of illiteracy, it was found in Massachusetts, in 1885, that of 122,263 persons above the age of ten years unable to read and write, 108,365 were foreigners. These figures are very striking, and justify the now very prevalent feeling that, with many material advantages, immigration, unrestricted, has introduced into our social system many elements that are, to say the least, most undesirable.

Chinese Immigration.—The immigration to this country of natives of China, and their social and economic relations to us, present such peculiar points of interest as to justify a separate consideration of the subject. The treaty negotiated between the United States and China, in 1868, by Mr. Anson Burlingame, and familiarly known as the Burlingame Treaty, contained the following explicit statement of the attitude of both countries regarding immigration and expatriation: "The United States of America and the Emperor of China cordially recognize the inherent and inalienable right of a man to change his home and allegiance; and also the mutual advantage of the free migration and emigration of their citizens and subjects respectively, from one country to the other, for the purposes of curiosity, of trade, or as permanent residents."

This treaty committed the United States to the principle of free intercourse between the two nations. After the passage of this treaty began a steady though not at first a very large influx of Chinese into this country, the majority of whom settled in the Pacific states, as laborers, miners, and traders. Between 1870 and 1880, some 40,000 Chinese arrived in American ports. (See SIX COMPANIES.) It was not long before their presence in American communities caused popular discontent. It was asserted that by their peculiar mode of living they were able greatly to underbid in the labor market workmen of the white races; that coming, as they often did, under contract as coolies, they formed a servile class; that they were subject to the jurisdiction of organizations of their own unrecognized by American law; that these secret tribunals exercised among them the power of life and death; that their presence lowered wages, deprived white labor of employment, and prevented immigration from other sources; that the Chinese were filthy in their habits, subject to leprosy and other loathsome diseases, immoral, obscene, spreading prostitution and introducing unnatural vices, so that they endangered alike the health and morality of the cities in which they made their home; and finally that their racial traits and peculiar civilization made it quite impossible that they should ever assimilate with the members of the Caucasian communities in which they lived. Many of these statements, while based upon the truth, are easily shown to have been grossly exaggerated. There is no proof that they do in reality form a servile class. Their personal habits compare in some respects favorably with those of the working classes of other races, and they certainly furnish a very small proportionate contribution to the number of known criminals. But, on the other hand, it was entirely true that some special vices, such as the use of opium and the practice of prostitution, were directly encouraged by the Chinese, while their inability to assimilate with the whites is undoubtedly a fact that admits of no question. This constituted a very serious objection to their continual immigration, for the enormous population of China, numbering

hundreds of millions, might send to our shores such a body of aliens as would outnumber in some parts of the country the native white population.

Because of these and other less reasonable considerations, it was not long before the white people of the Pacific states conceived an intense prejudice against all members of the Chinese race. This prejudice at first found expression in insults and violence, on the one hand, and in repressive and vexatious legislation on the other. As early as 1855, the California legislature imposed a tax of \$55 on every Chinese immigrant. In 1858 (this ten years before the Burlingame treaty) an act prohibited Mongolians from entering the state. In 1862 an act imposed a monthly tax of \$2.50 upon all Chinese except those engaged in the production of rice, sugar, tea, and coffee. All these acts were pronounced by the Supreme Court of California to be in violation of the constitution. In 1861 a tax was imposed upon all foreign miners, but was enforced against the Chinese alone. So, in San Francisco, a number of city ordinances were aimed directly at the Chinese inhabitants. Heavy license fees were imposed upon laundries; prisoners convicted of crimes were shorn (a disgrace to a Chinese); in 1863 it was enacted that the testimony of a Mongolian should not be received in any action in which a white man was concerned.

All these ordinances, and others to the same effect were rendered futile by the decisions of the Supreme Court of the United States, which held that any discrimination against the Chinese, as such, was illegal, because involving a violation of treaty obligations. It was, therefore, evident that relief could only come from action by Congress, and from this time the "Chinese Question" entered the sphere of national politics. In 1880 the Burlingame treaty was modified so as to allow the United States to limit the influx of the Chinese laborers, so soon as it should appear to be inimical to the national interests. In 1882 a bill originating in the Senate, and providing for the suspension of Chinese immigration for twenty years, was vetoed by President Arthur. A subsequent bill originating in the House of Representatives in the same year, and suspending Chinese immigration for ten years (1882-92), was signed by the president, and became law Aug. 5, 1882. Its provisions did not affect the free entrance to this country of merchants, professional men, or court officials; but as these form a very small proportion of the Chinese who come to the United States, the practical result of the bill has been to prevent the immigration of Chinese altogether; for the numbers of those entering the country fell, in the year 1882-83, from 35,614 to 381; and during the first six months of 1884 only 84 Chinese are known to have been admitted to our ports. Since then the law has been strictly enforced, though occasionally evaded by the smuggling of Chinese across the northern frontier from British Columbia.

The popular feeling against the presence of the Chinese has not been at all modified by their exclusion. Many deplorable acts of violence have been committed against them by mobs. In September, 1885, the Chinese laborers of Rock Springs, Wyoming, for refusing to join in a strike, were attacked by the white artisans; twenty-eight of them were murdered, and property valued at some \$150,000 was destroyed, for which the United States government subsequently indemnified the losers (1887). In 1888 a bill for the exclusion of the Chinese, much more sweeping than any that had hitherto been proposed, was passed by Congress, and signed by President Cleveland (Oct. 1). Its principal clause is as follows:

"Be it enacted, . . . that from and after the passage of this act it shall be unlawful for any Chinese laborer who shall at any time heretofore have been, or who may now or hereafter be, a resident within the United States, and who shall have departed, or shall depart, therefrom, and shall not have returned before the passage of this act, to return to or remain in the United States."

Restrictions upon Immigration; Pauper Immigration.—The right of a sovereign power to expel aliens or to refuse them admission has at all periods of history been exercised. It is inherent in the sovereignty of every nation, and is a part of the ordinary police power. It has been oftenest exercised against political offenders, even in republics. Thus in France, in 1849, a law gave the ministers the power of expelling aliens by a single decree. By the famous Alien and Sedition Law passed in the administration of President John Adams, the executive was authorized to exercise a similar power. Quite recently, so conservative a country as Great Britain expelled the anarchist Most. The government of Germany has since 1886 made wholesale expulsions of the Poles resident upon its eastern frontier. But the most sweeping legislation, intended to restrict immigration, is that of the United States, and is based not on political, but on social reasons. By the act of Congress passed in 1882, a head-tax was laid upon every immigrant by sea, and commissioners were appointed to inspect vessels entering American ports, who should have the power to prevent the landing of "any convict, lunatic, idiot, or any person unable to take care of himself or herself without becoming a public charge." Such persons were to be returned to the port whence they came at the cost of the owners of the vessels bringing them to this country. Under this act, the number of immigrants returned from the port of New York was, in 1883, 1350; in 1885, 1172; in 1888, 502.

A further law passed in 1885 makes it unlawful to prepay the transportation or to encourage in any way the immigration of aliens into the United States under contract or agreement to perform labor or service in the United States. The penalty for violating this act is a fine of \$1000 upon the persons themselves, and of \$500 upon the captain of

a vessel who knowingly transports the laborers. Exceptions are made in favor of actors, artists, lecturers, singers, domestic servants, or laborers skilled in industries not yet established in the United States. It has been held to apply to clergymen, a well-known clergyman in New York having been compelled to pay the full amount of the fine, as having violated the law in coming from England under contract to accept the rectorship of a city church. The object of this enactment, which has been several times amended and modified in the direction of greater strictness (in 1887, again in 1888, and in 1891), is to prevent a ruinous competition with American labor, resulting in an extension of the "sweating system" and an unnatural lowering of the normal standard of wages. It is likely that, as time goes on, even more rigorous measures will be taken to protect this country against the addition to its criminal and pauper classes—measures involving a system of consular inspection by representatives of our government in foreign countries.

Protection and Care of the Immigrant.—The first law passed by the United States to secure the health and safety of the immigrant was the act of 1819, providing against the overcrowding of passengers. This was amended and improved by the acts of 1855 and 1892. The first provision for the care of the immigrant after landing was made by the state of New York in 1824, followed by other measures in 1842, 1847, and 1855. In the last-named year Castle Garden was made a regular landing-place for immigrants, and provision was made for their instruction and protection. There their baggage was weighed and checked, their money honestly changed, and their friends communicated with. Ultimately a brokerage office, a post-office, a restaurant, wash-rooms, and a bureau of information were established, the use of which was free to all who landed. Many of the religious denominations established missions there. There is also a hospital for immigrants at Ward's Island well appointed and carefully managed. Commissioners appointed and paid by the state are in charge of the reception and distribution of the newly landed.

Bibliography.—The most recent as well as most satisfactory work on the general subject treated in this article is Prof. Richmond Mayo Smith's excellent study, *Emigration and Immigration* (1890). Other special works are: Bromwell, *History of Immigration into the United States* (1856); Geffcken, *Bevölkerungspolitik* (1886); *Report of the Emigration Commissioners of New York* (1889); *Emigration Statistics of Ireland* (1890); Leroy-Beaulieu, *De la Colonisation chez les Peuples Modernes* (1886); Seward, *Chinese Immigration* (1881); Whitney, *The Chinese and the Chinese Question* (1888); *Statistica dell' Emigrazione Italiana* (1891).

ÉMIGRÉS, the name given more especially to those persons who quitted France during the revolution. After the insurrection at Paris, and the taking of the Bastille, 14th July, 1789, the princes of the royal family departed from France. They were followed, after the adoption of the constitution of 1791, by all who considered themselves aggrieved by the destruction of their privileges, or who were exposed to persecution. Nobles quitted their châteaux; officers, with whole companies, passed the frontiers. Crowds of priests and monks fled to escape the oath of allegiance to the constitution. Belgium, Piedmont, Holland, Switzerland, and, above all, Germany, were overrun with fugitives of every age. Only a few had been able to save their property; the greater portion were in a state of destitution, and sank into utter demoralization. A court had formed itself round the princes at Coblenz; a government, with ministers and a court of justice, had been established, and communication was kept up with all the foreign courts unfavorable to the revolution. This conduct imbittered France, aggravated the position of the king, and drove the revolutionary party forward in their sanguinary career. Under the command of the prince of Condé, a body of É. was formed, which followed the Prussian army into Champagne. The result was that the severest laws were now put in force against the émigrés. Their lands were confiscated. The penalty of death was proclaimed against any one who should support or enter into communication with them. Thirty thousand persons were placed upon the list of É., and exiled forever from the soil of France, although many of them had refused to bear arms against their country. Not until after the failure of their attempt to land at Quiberon in 1795, did the É. abandon all thoughts of penetrating into France by force of arms. Condé's corps, after the peace of Luneville, was obliged formally to dissolve, and sought an asylum in Russia. Even under the directory, however, many had endeavored to obtain permission to return to France. The general amnesty proclaimed by the first consul was therefore joyfully hailed by the greater portion of the émigrés. Many, however, did not return home till after the downfall of Napoleon. Dignities, pensions, and offices were now showered upon these faithful adherents; but, according to the charter of 1814, they were unable to recover either their estates or their privileges. Finally, on the motion of the minister Villèle, the É. who had lost their landed estates, by the law of the 27th April, 1825, received a compensation of 30 million francs yearly on the capital of 1000 million francs. After the July revolution, however, the grant was withdrawn. Compare Antoine de Saint-Gervais, *Histoire des Émigrés Français* (3 vols., Paris, 1823), and Montrol, *Histoire de l'Emigration* (2d edit., Paris, 1825).

EMILIAN (or **ÆMILIAN**) **PROVINCES**, a name now employed to designate a portion of the recently formed kingdom of Italy, comprising the northern part of the states of the church (the Romagna), and the duchies of Parma and Modena. The name is derived from the ancient *Via Æmilia* (a continuation of the *Via Flaminia*, or great northern

road), which passed through these territories. The E. P. were formally annexed to Sardinia in April, 1860. See ITALY.

EMINENCE, a title given to cardinals by Urban VIII. Up to the period of his pontificate, they had been called most illustrious and most reverend. The assumption by the Roman Catholic clergy of this and other ecclesiastical titles, not having reference to any "pretended province, or to any pretended see or diocese," were not struck at by the English statute intended to prevent the assumption of certain ecclesiastical titles in respect of places in the United Kingdom. See ECCLESIASTICAL TITLES ASSUMPTION ACT.

EMINENT DOMAIN, the original ownership retained by the state, by which land or other private property may be taken for public use or benefit. It is the highest and most exact idea of property remaining in the government, or in the aggregate body of the people in their sovereign capacity, giving the right to resume possession in the manner directed by law. If the proper authorities propose to open a street, or charter a railroad, or set apart land for a park, or for any lawful and reasonable purpose, and the owner of lands in the route or space desired refuse to sell or ask an unreasonable price, the state by eminent domain has the power of control, and process may be issued from a court having authority to compel the surrender of the property. The constitution of the United States limits the exercise of this right to cases where the public good demands it, and requires compensation to those from whom the property is taken. These conditions are also named by many of the state constitutions.

EMIN PASHA. This name, now so well known throughout the world, is the title adopted by Edouard Schnitzer, a German, born in the town of Oppeln, Prussia, March 28, 1840, of Protestant parents. He studied medicine in Breslau, Berlin, and Königsberg. At an early age he entered the service of Ismail Hakki Pasha, once governor-general of Scutari, and a Mushir of the empire, and with him went to Armenia, Servia, and Arabia. In 1860 he was made surgeon in the Turkish army. He became attached to the "Young Turk" or reform party in Stamboul, the organ of which, for its boldness in the reform interest, was suppressed three times by the authorities. On its last suppression Emin was expelled from the country. On the death of his patron he went to Niesse, where his mother and sisters lived, and in 1875 went to Egypt. He was in Constantinople at the time of the assassination of the Sultan Abdul Aziz, being one of the advisers of Midhat Pasha (q.v.), the prime-minister. He was at this time only a civilian pasha, receiving pay during the time employed. When the prime-minister was dismissed, at the time of the last Russian-Turkish war, Emin went to Asia. He joined a caravan and, passing through Suakin, made his way to Khartoum. Much reduced in circumstances, he procured an introduction to Gen. Gordon, who gave him a billet as storekeeper, and afterwards appointed him doctor. Later he was given the position of surgeon-general on Gen. Gordon's staff (1876). His time was fully occupied, as besides his regular duties he wrote elaborate papers on scientific subjects, accumulated masses of scientific matter, collections, etc., and was sent on important missions to Uganda and Unyoro. He was an expert linguist, being familiar with Turkish, Arabic, German, French, Italian, English, and many African dialects. When Gen. Gordon went to Khartoum as Governor-General he sent Emin to rule the Equatorial Provinces (1878). In three years he succeeded in driving out the slave-traders; where there was a deficiency in the revenue he created a surplus; conducted his government on the lines of Gen. Gordon's ideas, and was withal modest, retiring, and conscientious. When the Mahdi's (q.v.) rebellion broke out and everything was in confusion, Emin remained at his post. At Khartoum, Hicks's army was massacred, the Egyptian garrison at Soudan was abandoned to its fate, and Gen. Gordon was left to perish while awaiting relief from the expedition sent out, which was slowly creeping up the Nile, and which arrived too late. When Egyptian rule was finally wiped out by the English in other sections, the Equatorial Provinces were forgotten, and Emin was left to depend upon his own resources. Had he chosen to leave behind him helpless women and children, who looked to him for protection, and abandon his people to the horrors of slavery, he could easily have cut his way out. But he did not make the desertion of himself by the Egyptian government a pretext for his desertion of them. He had 4000 troops, and he immediately organized a body of native soldiers; lacking money, he still managed to maintain his position and govern the country. He taught the natives to raise cotton, rice, indigo, and coffee, weave cloth, make shoes, candles, soap, etc. He vaccinated the natives for small-pox, and opened the first hospital in the country. He established the first post-office, and a post route with forty officers. He organized expeditions and made important geographical discoveries in the region of Albert lake, and in every way demonstrated his capability for governing barbarian tribes. The last European whom he met before Stanley was Dr. Junker, from whom he parted Jan. 1, 1886. From that date until he received tidings of Stanley, in 1887, communication was irregular and infrequent. In Nov., 1887, he went to lake Albert, hoping to see him, not knowing whom he was to meet, having only recently heard that a white man was in the country. After eight years of comparative silence, without books, periodicals, or regular news, and for five years, until 1888, without supplies, except such as he produced himself, he naturally longed for tidings. As a scientific man he had found much to interest him, and, being ambi-

tious, almost involuntarily he was thrust forward to the command of the Equatorial Provinces. Absorbed in his pursuits, it is rather remarkable that previous to meeting Stanley he had never even visited the south end of lake Albert. His first encounter with the relief expedition was on May 1st, 1888, at Kavalli's, when the first installment of arms, ammunition, etc., was handed to him, and Stanley left him, May 23, with the expectation of again meeting him preparatory to starting for home. The Pasha had the utmost confidence in his people, believing that those to whom he had devoted himself for so many years, and whose condition he had so greatly improved, could not be disloyal to him. He trusted them too fully, and he awoke from his dream too late. They looked down upon him as a bird collector, without any respect. While he has many fine traits of character, and there is much to admire, he was more devoted to his botanizing, entomologizing, geologizing, and ornithologizing than to his duties as a governor, and loved the title of M.D. more than that of Pasha. With immense energy for teaching his people agriculture, manufactures, etc., he lacked the decision required to command his troops; hence, when trouble came he was unprepared for it. Many reports were circulated to the effect that Stanley was only an adventurer, whose aim was to aid the Pasha in crushing the people and reducing them to slavery. On the fall of Khartoum some of the most influential chiefs incited the people to rebellion, and Emin was deposed and made a helpless prisoner, with the prospect of being taken to Khartoum. Plans were laid by them to entrap Stanley on his return to lake Albert, but these proved unsuccessful. The Pasha was freed in Nov. of the same year, and although attacked by the Dongola, he was able to repulse them. This solitary man was engaged in a task as impossible as that of Gen. Gordon's; while he showed much bravery, his officers were plotting treason, and it was found that nothing could inspire him with the idea that his case was hopeless; he was serene and resigned, and very undecided as to his movements. While Stanley was waiting impatiently for his answer as to whether he would return with him to Egypt, he was waiting to learn if his people were willing to go with him; if not, he would remain. On Feb. 17 Emin again reached Kavalli's, and on April 1, when ready to make the first move towards home, only four of his people were ready to go with him. While the expedition was sent out to relieve the distressed condition of Emin Pasha, he was still at liberty to remain in Africa if he desired. Three propositions were made to him: He might return to Egypt, receive the payments due him, and still act under orders from the Egyptian government. By king Leopold of Belgium he was offered the command of the Equatorial Provinces, with the understanding that he was to keep open communication between the Nile and Congo, and maintain law and order. And, thirdly, Stanley desired him to establish the East African Association. In the mean time, he had offered his services to the British East India Company. A meeting was finally arranged at Bagamoyo, Dec. 4, 1889, and, amid general joy and feasting, an unfortunate accident occurred by which Emin, in falling from a veranda, was seriously injured. Stanley was obliged to leave him in the hospital, and set out for home, Dec. 6, 1889. The Pasha recovered entirely, sent his resignation to Cairo, and finally accepted a position in the service of the German East Africa Company. While holding this post he was killed by the natives in 1892.

EMIR, an Arabic word, equivalent to "ruler," is a title given in the east, and in the n. of Africa, to all independent chieftains, and also to all the actual or supposed descendants of Mohammed through his daughter Fatima. The latter are very numerous throughout the Turkish dominions, but although entitled by birth to be classed among the first four orders of society, they enjoy no particular privileges or consideration; on the contrary, they are found engaged in all sorts of occupations, and are to be met with among beggars, and the lowest of the populace, as frequently as among the molahs. Their privileges are confined to a few unimportant matters, chiefly to the exclusive right to wear turbans of a green color, that having been the favorite color of the prophet. They are placed under the supervision of the emir-beshir. In former times, the title of emir was borne by the leaders in the religious wars of the Mohammedans, as well as by several ruling families, such as the Thaherides and Samanides in Persia, the Tulunides in Egypt, the first seven Ommaïades in Spain. The title emir, in connection with other words, likewise designates different offices. *Emir-al-Mumenin*, "prince of the faithful," is the title assumed by the caliphs themselves; *emir-al-muslem*, signifying the same thing, was the title of the Almoravides. *Emir-al-Omrah*, "prince of princes," was the title of the first minister, under the caliphs and the East Indian Moguls, who united in his own person the highest civil and military dignities. It is now the title of the governors of different provinces. The Turkish master of the horse is styled *emir-achor*; the standard-bearer, *emir-alem*; and the leader of the caravans of pilgrims to Mecca, *emir-hadji*. *Ameer* is another spelling of the word.

EMMANUEL, EMANUEL, or IMMANUEL, a Hebrew name, whose signification—"God with us"—is not, by itself, proof that he to whom it would be given was divine. This and similar combinations of divine names were, and still are, in ordinary use among Jews. But the evangelist Matthew (i. 23) applies it in a special manner to the child Jesus; and the whole history of the nativity is in harmony with the special application. Some Christian interpreters consider that the reference (Is. vii. 14) to the birth of the Messiah is direct and exclusive. But the prophecy itself and the circumstances in which it was spoken evidently call for a speedy fulfilment according to the ordinary laws of nature, the virgin being one whom the prophet was commanded then

to marry, and her son the child spoken of, under another name, in the eighth chapter. Yet, besides this, as many interpreters believe, the prophecy was designed to have a secondary and full accomplishment in the miraculous conception and birth of Jesus Christ from his virgin mother. This is proved not simply by Matthew's application of the prophecy and by the New Testament account of the nativity, but also by the whole subsequent exhibition of the character and work of Jesus in attestation of his claim to be the incarnate Son of God.

EMMANUEL, surnamed **THE GREAT**, 1469-1521, King of Portugal, was the son of Ferdinand, Duke of Viséu. He succeeded John II. in 1495. Portugal attained her greatest glory and power during his reign, through the discoveries and expeditions of Vasco da Gama, Almeida, and Albuquerque, though he, as king, contributed very little to it. In order to win Isabella of Castile for his wife he banished the Moors and Jews, though they were the richest and most useful class of people in the kingdom.

EMMANUEL COLLEGE, CAMBRIDGE, was founded in 1584 by sir Walter Mildmay, chancellor of the exchequer and privy-councilor in the reign of queen Elizabeth. The foundation fellowships are thirteen in number. These fellowships are open to all her majesty's subjects, and a candidate becomes eligible to them on proceeding to the degree of B.A. or any equivalent degree. All the foundation fellows are obliged to proceed regularly to the further degree in arts, law, medicine, or any other faculty they have selected. There must be four of them always in priest's orders; and any who are not tutors or bursars in the college, are bound to be in orders at the end of the seventh year of their fellowship, at the risk of forfeiting it three years afterwards. The college also possesses two fellowships and four scholarships on sir Wolstan Dixie's foundation (but the Dixie fellows have no voice in college affairs, nor any claim to the offices or dividends of the college). The patronage of the college consists of 24 benefices, situated in the eastern and south-western counties of England; and of two schools, one in Norfolk, and the other in Suffolk. This college had, in 1896, 162 undergraduates.

EMMANUEL PHILIBERT, surnamed the **IRON-HEADED**, 1528-1580, Duke of Savoy, was one of the most able generals of his time. He entered the service of Charles V., and on the abdication of that emperor, was made governor of the Low Countries. In 1557 he gained a great victory at Saint-Quentin, and in 1574 he secured the evacuation of Piedmont, where he ruled wisely until his death.

EMMENAGOGUES, medicines intended to restore, or to bring on for the first time, the menstrual excretion in women. The E. chiefly in use are the preparations of aloes, iron, myrrh, and other stimulants in connection with purgatives; and also the local use of the warm bath, leeches, fomentation, etc. Some recommend still more powerful and direct applications to the uterine mucous membrane; as galvanic pessaries, lunar caustic, scarifications, etc.; but these are not in general use. See **MENSTRUATION**.

EMMENS, STEPHEN H., scientist, b. Kent, England, Dec. 27, 1843; educated at King's college, London; studied chemistry and mining and electrical engineering; invented the giant explosive known as emmensite, also a method of converting old ordnance into effective guns; obtained the X-rays with the aid only of sunlight; and, Jan. 1, 1897, sent a memoir to the Smithsonian Institution, the *Académie des Sciences* of Paris, and the Royal Society of London, detailing an original theory of natural law in opposition to Newton's law of gravitation.

EMMENSITE. See **EXPLOSIVES OF HIGH POWER**.

EMMERICH, a t. of Rhenish Prussia, is situated on the right bank of the Rhine, on the borders of Holland. It is a very old town, and has a Dutch character of cleanliness. It has a custom-house, an orphan-house, a gymnasium, and several churches. Pop. '90, 9622.

EMMET. See **ANT**.

EMMET, ROBERT, 1780-1803; b. Dublin, a school-fellow and college-mate of Moore, the poet. Both were members of the historical society, and ardent champions of the cause of freedom for Ireland. In 1798, Emmet was expelled from the university on account of his connection with the United Irishmen. He went to the continent, where he remained until 1802; then returned secretly to Dublin and endeavored to plan a general revolution. July 23 of that year, he made an attempt to seize the arsenal and city of Dublin; but his mob of followers created scarcely a serious riot, flying in panic at the first firing by the police. Finding his revolution a miserable failure, Emmet hid himself in the Wicklow mountains, intending to escape to the continent, but he delayed long enough to have an interview with the daughter of Curran, the famous advocate, with whom he was in love, and this delay led to his arrest. He was tried for treason, convicted, and executed Sept. 20, 1803. His speech, on being asked why sentence should not be pronounced, has long been held up as a model of patriotic eloquence.

EMMET, ROSINA, was born in New York City, Dec. 13th, 1854. She is best known as an illustrator of popular books, and as the winner of a prize of \$1000 offered by Prang for a design.

EMMET, THOMAS ADDIS, LL.D., 1764-1827, b. Cork; brother of Robert. He was educated in Trinity college, Dublin, and studied medicine in Edinburgh, and visited the medical schools of the continent. In 1788 he gave up medicine, and took to the study

of law being admitted to the Dublin bar in 1790. He was involved as counsel and as leader of the United Irishmen, and in Mar., 1798, he, with others, was arrested. He was kept a prisoner until June, 1802, and then received freedom on agreeing to leave the country. He went to Hamburg and to Brussels, and, in 1803, to France, where he had an interview with Napoleon, who was at that time contemplating an invasion of England. In 1804 he went to New York, where he soon gained a large law practice, and received much attention as a political exile. In 1812 he was attorney-general of New York state, but served only six months.

EMMET, THOMAS ADDIS, physician, b. in Virginia, in 1828; graduated at the Jefferson medical college, 1850; was assistant surgeon and surgeon-in-chief at the Woman's hospital, New York, in 1855-72; afterward became a specialist on diseases of women, introducing important operations and treatment, and writing much on the subject. In 1896, his unique collection of works on American history, gathered at a cost of \$300,000, was presented to the New York public library, through the generosity of John S. Kennedy. He received the Letare gold medal of the university of Notre Dame in 1897.

EMMET, a co. in n. Iowa, on the border of Minnesota; 408 sq. m.; pop. '90, 4274. It is undulating, with fertile soil, and contains a number of small lakes. Co. seat, Estherville.

EMMET, a co. in n. Michigan, in the peninsula bordering on Mackinaw straits and lake Michigan, traversed by the Grand Rapids and Indiana railroad; 438 sq. m.; pop. '90, 8756. The surface is undulating and the soil fertile, mostly of prairie; productions agricultural. Co. seat, Harbor Springs.

EMMITTSBURG, a borough in Frederick co., Md., 49 miles n.w. of Baltimore, by the Western Maryland railroad, and 10 m. s.w. of Gettysburg, Penn. It is noted principally as the seat of Mount St. Mary's college, one of the largest Roman Catholic educational institutions in the United States, established in 1809. Near by is St. Joseph's academy, the mother-house of the sisters of charity in the United States. Pop. '90, 844.

EMMONS, a co. in N. Dakota; formed 1879. Pop. '90, 1584. Co. seat, Williamsport.

EMMONS, EBENEZER, 1799-1863; b. Mass.; professor of natural history in Williams college, 1833, and of chemistry in Albany medical college, 1838. In 1836 he was one of the commission to make a geological survey of New York, and in 1856 became state geologist of North Carolina. He wrote text books and reports on mineralogy and geology.

EMMONS, GEORGE FOSTER, b. Vt., 1811; midshipman, 1828, and rose to rear-admiral in 1872. He was in the Wilkes exploring expedition, and off the Mexican coast during the war with that country. In the war of the secession he commanded blockading vessels, and was in Dahlgren's fleet; and from 1864 to the close of the war he commanded a division of the blockading fleet in the gulf of Mexico. He d. 1884.

EMMONS, NATHANAEAL, D.D., was b. at East Haddam, Conn., in 1745, and graduated at Yale college, in 1767. In 1773 he was ordained pastor of the Congregational church in Franklin, Mass., and continued in the office 54 years. He superintended the studies of nearly 100 young men in preparation for the ministry, many of whom became strong and useful preachers. He was one of the originators of the Mass. missionary society, and one of the editors of its missionary magazine, from which the *Missionary Herald* grew. When masonry was popular he zealously opposed it; when the anti-slavery movement was denounced he actively favored it. He was a decided "Federalist," and caused great excitement by his political writings. As an author and preacher he exerted a very great influence on the churches. During his life he published 4 elaborate dissertations, more than 100 magazine articles, and about 200 sermons, of which 7,000 copies were issued. At his death a part of his sermons was published in 7 octavo volumes, and a new edition, enlarged, in 6 volumes. About 75 years of his life were spent in earnest and systematic study, during the greater part of which time he read and wrote 10, 12, and sometimes 14 hours a day. He has been described by those who knew him well as "methodical, temperate, regular in his habits, distinguished for punctuality, precision and sharpness of mind, keen analysis, self-consistency, wit, frankness, honesty, and reverence for the truth." As a Calvinist he wished to be considered neither "high" nor "low," but consistent. On one Sabbath he would present the doctrine of divine sovereignty with such strength that some might think him a fatalist; the next Sabbath he would advocate free will so powerfully that some might call him a Pelagian; and in a third sermon he would lay out his strength in showing that the sovereignty of God was not inconsistent with the free agency of man. He steadily adhered to old usages, and wore the antique dress and three-cornered hat as long as he appeared in public. He retained the strength of his faculties to the last, and died in 1840, with an unflinching faith in Christ.

EMOLLIENTS (from Lat. *mollis*, soft), substances used to soften the textures to which they are applied, as poultices, fomentations, etc., externally, and demulcents (q.v.) internally.

EMORY, JOHN, D.D., 1789-1835; b. Md.; brought up to the law, but became a Methodist preacher in 1810. In 1820 he was a delegate to the British Wesleyan conference; in 1824, book agent of his church at New York, and in 1832 was chosen bishop. He

wrote *The Divinity of Christ Vindicated; Defense of our Fathers*; and other works on religious subjects.

EMORY, ROBERT, D.D., 1814-48; son of John; president of Dickinson college; author of a life of his father, and *History of the Discipline of the Methodist Episcopal Church*.

EMORY, WILLIAM HEMSLEY, B. MD., 1811; a graduate of West Point; in 1863, col. of cavalry, and in 1865, maj.-gen. of volunteers. He served with credit in the Mexican and civil wars, and was retired, with rank of brig.-gen., 1876; d. 1887.

EMOTION. This is the name for one of the comprehensive departments of the human mind. It is now usual to make a threefold division of the mind—E., or feeling; volition, or action prompted by feelings; and intellect, or thought. It is not meant that these can be manifested in absolute separation; or that we can be at one time all E., another time all volition, and again all thought, without either of the other two. But although our living mind is usually a concurrence, in greater or less degree, of all of them, still they can be distinguished as presenting very different appearances, according as one or other predominates. Wonder, anger, fear, affection, are emotions; the acts that we perform to procure pleasurable feelings, and avoid painful, are volitions, or exercises of will; memory and reasoning are processes of thought, or intellect.

E. is essentially a condition of the waking, conscious mind. When asleep, or in a faint, or in any of those states called "being unconscious," we have no E.; to say that we have would be a contradiction, which shows that "emotion" is a very wide and comprehensive word. In fact, whenever we are mentally excited "anyhow," we may be said to be under emotion. Our active movements and intellectual processes can sometimes go on with very little consciousness; we may walk and scarcely be aware of it; trains of thought may be proved to have passed through the mind while we are unconscious of them. Now, it is these unconscious modes of volition and intellect that present the greatest contrast to E.; showing how nearly co-extensive this word is with mental wakefulness, or consciousness, in its widest signification.

E., then, is of the very essence of mind, although not expressing the whole of mind. There are three distinct kinds or divisions of it: pleasures, pains, and excitement that is neither pleasurable nor painful.

Every kind of pleasure is included under E. in its widest acceptance. The pleasures of the senses are as much of an emotional character as those pleasures that are not of the senses—as, for example, those of power, pride, affection, malevolence, knowledge, fine art, etc. Every one of our senses may be made to yield pleasurable E.; and all those other susceptibilities, sometimes called the special emotions, of which a classification is given below, are connected with our pleasures or our pains. What pleasure is in its inmost nature, each one must find from his own experience; it is an ultimate fact of the human consciousness which cannot be resolved into anything more fundamental, although, as will be seen, we can lay down the laws that connect it with the other manifestations of mind—namely, action and thought, and with the facts of our corporeal life.

In the next place, pain is a species of emotion. We know this condition as being the opposite of pleasure, as the source of activity directed to its removal or abatement, and as the cause of a peculiar outward appearance, known as the expression or physiognomy of pain. All the inlets of pleasure are also inlets of pain. The various sensibilities of the mind, whether the outward senses, or the more inward emotions, give rise at one time to pleasure, at other times to pain, the conditions of each being generally well understood by us; we can define the agencies that cause pleasure or suffering through the skin, the ear, or the eye.

But it is requisite, further, to recognize certain modes of neutral excitement, in order to exhaust the compass of emotion. We are very often roused, shocked, excited, or made mentally alive, when we can hardly say that we are either pleased or put to pain. The mind is awakened and engrossed with some one thing, other things are excluded; and the particular cause of the excitement is impressed upon us so as to be afterwards remembered, while all the time we are removed alike from enjoyment and from suffering. This is a kind of E. that has its principal value in the sphere of intellect. The E. of wonder or astonishment is not seldom of this nature; for although we sometimes derive pleasure, and sometimes the opposite, from a shock of surprise, we are very frequently affected in neither way, being simply *impressed*. The strange appearance of a comet gives far more of this neutral effect than of the others. It is a thing that possesses our mind at the time, and is afterwards vividly remembered by us, and these are the chief consequences of its having roused our wonder.

The physical accompaniments of E. are a part of its nature. It has been remarked in all ages, that every strong passion has a certain outward expression or embodiment, which is the token of its presence to the beholder. The child soon learns to interpret the signs of feeling. Joy, grief, affection, fear, rage, wonder, have each a characteristic expression; and painters, sculptors, and poets, have adopted the demeanor of passion as a subject for their art. There must be some deep connection in the human

frame between the inward states of consciousness and the physical or corporeal activities, to produce results so uniform throughout the human race. When we study the facts closely, we obtain decisive proof of the concurrence of the following members and organs in the manifestation of feeling.

In the first place, the *muscles* or *moving organs* are affected. Under strong excitement, the whole body is animated to gesticulation; in less powerful feelings, the expression confines itself more to the *features* or the movements of the face. These last have been analyzed by sir Charles Bell. The face has three centers of movement—the mouth, eyes, and nose; the mouth being most susceptible, and therefore the most expressive feature. In the eyes, expression is constituted by the two opposite movements of the eyebrows; the one raising and arching them (prompted by a muscle of the scalp, *occipito-frontalis*), the other corrugating and wrinkling them. The one movement is associated with pleasing states, the other with painful. The nose is acted on by several muscles, the most considerable of which is one that raises the wing together with the upper lip, and is brought into play under the disgust of a bad smell and in expressing dislike generally. The mouth is principally made up of one ring-like muscle (*orbicularis*), from which nine pairs radiate to the cheeks and face. In pleasing emotions, the mouth is drawn out by the action of two pairs of muscles, named the buccinator and zygomatic, situated in the cheek. The expression of pain is determined by the contraction of the aperture of the mouth, through the relaxation of those muscles, and the contraction of the ring-like muscle that constitutes the flesh of the lips; and by two muscles in the chin, one depressing the angle of the mouth, and the other raising the middle of the lower lip, as in pouting. Besides the features, the voice is instinctively affected under strong feelings; the shouts of hilarious excitement, the cry of sharp pain, and the moan of protracted agony, are universally known. Another important muscle of expression is the diaphragm, or midriff, a large muscle dividing the chest from the abdomen, and regularly operating in expiration. In laughter, this muscle is affected to convulsion.

In the second place, the *organic functions* of the system are decidedly influenced for good or evil under emotion. The glandular and other organs acted on in this way comprehend the most important viscera of the body. The lachrymal secretion is specifically affected under passion; the flow of tears being accelerated to a rush, instead of pursuing the tranquil course of keeping the eyeball moist and clean. The states of the sexual organs are connected with the strongest feelings of the mind, being both the cause and the effect of mental excitement. The digestion is greatly subject to the feelings, being promoted by joy and hilarity, not in too great excess, and arrested and disturbed under pain, grief, terror, anger, and intense bodily or mental occupation. The skin is known to respond to the condition of the mind; the cold sweat in fear is a derangement of its healthy functions. The respiration may be quickened or depressed according to the feelings. The action of the heart and the circulation of the blood are subject to the same causes. The nature of this influence was explained under BLUSHING. Lastly, in women, the lacteal secretion participates in the states of E., being abundant, healthy, and a source of pleasure in a tranquil condition of mind, while grief and strong passions change it to a deleterious quality.

The connection between mental E. and bodily states being thus a fact confirmed by the universal experience of mankind, can we explain this connection upon any general law or principle of the human constitution? Have we any clue to the mysterious selection of some actions as expressing pleasure, and others as expressing pain? The reply is, that there is one principle or clue that unravels much of the complexity of this subject—namely, that *states of pleasure are usually accompanied with an increase in some or all of the vital functions, and states of pain with a depression or weakening of vital functions*. This position may be maintained on a very wide induction of facts, many of them very generally recognized, and others open to any careful observer; there being, however, some appearances of an opposite kind, which have to be satisfactorily accounted for, before we can consider it as fully established.

If we consider first the respective *agents* or causes of pleasure and pain, we must acknowledge that they are very generally of a nature to accord with the view now stated. How many of the sources of pleasure are obviously sources of increased energy of some vital organs. The cause of food is too obvious to need any comment. Warmth within limits both confers pleasure and stimulates the skin, the digestion, and other functions. Fresh air exhilarates the mind, while quickening the respiratory function. Light is believed to stimulate the vital actions no less than the mental tone. And if there be some pleasures of sense, such as mere sweetness of taste, fragrant odors, music, etc., that do not obviously involve greater energy of vital function, they might be seen to do so, if we knew more than we do respecting the operation of the various organs, and we are certain that they do not have the opposite effect. Medical authorities are so much impressed with the general tendency of pleasures, that they include them in the list of *stimulants* in cases of low vitality. If we pass from the senses to the special emotions, such as wonder, power, tender affection, taste, we find that when those are pleasing, they also increase the animal forces at some point or other. A stroke of victory sends a thrill through the whole system; and if the pulse were examined at that moment, we should find that it beats stronger. The illustration for pains is exactly parallel, but still more striking. It is notorious that hurts, wounds, fatigue, ill-health, hunger, chillness,

nauseous tastes and odors, the silence of a prison, the gloom of utter darkness, failure, humiliation, contumely, deprivation of one's usual comforts and pleasures—while causing pain, cause in a corresponding degree a depression of the powers of the system. There are some apparent exceptions, as in the stimulus of the whip, the bracing agency of cold, and the effect of misery generally in rousing men from lethargy to action, but these could all be shown to be quite compatible with the main principle.

If we turn from the agents to the *expression*, or modes of manifestation, of the opposing mental conditions, we shall find that the facts are of the same general tenor, although with some seeming exceptions. Joy makes a man spontaneously active, erect, animated, and energetic. It is as if a flush of power were diffused through his members; and the efforts he is then prompted to, lead to no painful exhaustion. The opening up of the features, by the elevation of the eyebrows and the retraction of the mouth, indicates that the stream of energy has coursed over the face. In a still greater shock, the convulsiveness of laughter, by which respiration is quickened, attests the superabundance of the animal spirits. The body stands more erect, and every act done is done with more emphasis. Grief and depression are the opposite in every particular. The frame is languid and stooping, the features lifeless, the voice is a feeble wail; and although there is a species of convulsion attending on this condition of mind, it is a marked contrast to the other. The sob is caused by the *partial paralysis* of the diaphragm, which necessitates great voluntary efforts in order that the breathing may proceed. The choking sensation at the throat is also a species of paralysis from loss of vital power. The convulsions arising under such circumstances are productive of an exhausting reaction, which is the case with all the energetic movements stimulated by extreme pain.

Such is undoubtedly the general fact. But why should pain stimulate, or give strength to, *some special* muscles, such as the corrugator of the eyebrow, and the depressor of the angle of the mouth? This has appeared a great difficulty to the ablest physiologists. It would look as if pleasure coincided with an energetic wave sent to some muscles, and pain with an energetic wave sent to others; so that the opposite conditions of mind are equally accompanied by an accession of power to some bodily member. But if we examine the matter more narrowly, it will probably turn out that the muscles that seem to be stimulated under pain, are not so in reality, but obtain the upper hand through the general relaxation of the system. Thus, take the mouth. We know the state of the mouth in languor, inaction, and sleep. We know that when we are roused in any way, the muscles of the face operate and draw the mouth asunder in a variety of forms. Pleasure corresponds with our energetic moods, pain causes a collapse towards the sleepy and exhausted condition which represents a state of departed energy. So the collapse of the body might seem an exertion of the *flexor* muscles, or those that bend the frame forward; but we are well aware that such collapse takes place when the system is totally lifeless. A renewed energy, as a matter of course, makes us stand erect.

This is a part of the case in reply to the objections arising from a specific expression of pain, but not the whole; and the answer to the difficulties still remaining is furnished by a fact that, if well authenticated, will probably dispose of nearly all the exceptions to the general principle now contended for. It is the organic functions, *more than the muscular system*, whose increased vitality coincides with pleasurable feeling, and their diminished action with pain. Muscular exercise is often highly agreeable, but the pleasure of *resting* after exercise is still more so. Now, there can be little doubt that what happens in the state of healthy repose is this: the amount of vital force stimulated by exercise—the increased energy derived from plying the lungs and heart—is now allowed to leave the active members, and to pass to the other organs—the digestion, skin, and various secreting glands—and it is their aggrandizement that is associated with the comfortable sensations of repose and sinking into sleep. Thus, the abating of muscular energy may be a cause of pleasure, provided the organic functions are raised in consequence; but it may be maintained as a highly probable supposition, that a certain health and energy of some or all of these functions (it is difficult to draw a specific line) is essential to pleasurable feeling. We may doubt whether even mental causes can materially raise the tone of enjoyment, if they do not also raise the activity of some of these organs. Not only may a person be very happy and comfortable in the prostration of the muscular energy, even in a sick bed, but one way of procuring comfort is to induce a total inaction of the moving members, to allow all the available nervous power to pass to the viscera and secretions. Hence a *forced relaxation* of the muscles *generally*, by the employment of *some* of them, is a means of soothing the mind under pain. Thus, the active intervention of certain small muscles—such as the corrugator of the eyebrows, the orbicular muscle of the mouth, and the depressor of the angle of the mouth—by relaxing a much greater body of muscle, is the means of setting free vital energy for behoof of the other parts of the system. This would explain the mental relief furnished by an assumed sadness of feature, and a voluntary collapse of the body generally.

It would appear, then, that the stimulus of muscle is not necessarily or immediately a cause of pleasure; while the stimulus of the organic functions is so. Thus, a bracing cold quickens the activities, but is apt to cause a shock of pain, by temporarily checking the action of the skin; when the reaction arrives, this check is converted into stimula-

tion, and the mental state is altered in like manner. A bitter tonic must be supposed to act on the same principle.

The emotions of the human mind may be classified under two heads:

First—The pleasures, and pains, and modes of excitement growing out of the exercise of the senses, the movements, and the appetites. See SENSES. The five senses, commonly recognized, are partly sources of pleasure and pain, in which case they yield emotion, and partly sources of knowledge, by which they are related to the intellect. There are other sensibilities not included in the five senses, but ranking with them in those particulars—as the feelings of muscular exercise and repose, and the sensations of digestion, respiration, etc.

The second head comprises the special emotions not arising immediately out of sensation, although connected therewith. These have been variously classified. The following is one mode of laying them out: 1. Feelings of liberty and restraint; 2. Wonder; 3. Terror; 4. Tender affections; 5. Emotions of self-complacency, love of approbation, etc.; 6. Sentiment of power; 7. Irascibility; 8. Emotions of action, including the interest of pursuit or plot; 9. Emotions of intellect, love of knowledge, consistency, and inconsistency; 10. Fine art emotions, or taste; 11. The moral sense.

On this subject, see Müller's *Physiology, Movements due to the Passions of the Mind*; Bell's *Anatomy of Expression*; Stewart on the *Active Powers*; Bain on the *Emotions and the Will*, etc.

EMPANEL, or **IMPANEL**. In law this word is used with entirely different significations in English and American practice. In the first it denotes the entering upon a schedule or roll, by the sheriff, of the names of a sufficient number of jurors to serve on the grand and petty juries; in the American practice the term applies usually to the list of jurors drawn for the trial of a particular case, and the court is said to empanel the jury by calling those thus selected to the jury box, passing upon their qualifications and swearing them in. But occasionally in courts in this country the word is used in the English acceptance.

EMPECINA DO, DON JUAN MARTIN DIAZ, EL, one of the leaders of the Spanish revolution of 1820, was b. in 1774. He was the son of poor parents, and entered the Spanish army in 1792. At the head of 5,000 or 6,000 men, he carried on a guerilla warfare against the French during the Peninsular struggle, and acquired great distinction. In 1814, he was appointed col. in the regular army, and the king himself created him field-marshal; but in consequence of petitioning Ferdinand, in 1815, to reinstitute the cortes, he was imprisoned, and afterward banished to Valladolid. On the outbreak of the insurrection in 1820, he took a prominent part on the side of the constitutionalists, and on several occasions exhibited great courage, daring, and circumspection. In 1823, after the triumph of the absolutists, he was arrested, exposed in an iron cage to the contumely of the passers-by, and finally executed on a common gibbet, amidst the ferocious yellings of a debased and liberty-hating populace.

EMPEDOCLES, a Greek philosopher of Agrigentum, in Sicily, lived about 450 B.C. So great was the estimation in which he was held by his fellow-citizens as a physician, a friend of the gods, a predictor of futurity, and a sorcerer, or conjuror of nature, that they are said to have offered him the sovereignty. But being an enemy of tyranny, he declined it, and was the means of delivering the community from the dominion of the aristocracy, and bringing in a democracy. There was a tradition that he threw himself into the crater of Etna, in order that his sudden disappearance might beget a belief in his divine origin; this, however, can only be regarded as a mere fable, like the story told by Lucian, that Etna threw out the sandals of the vain philosopher, and thus destroyed the popular belief in his divinity. The statement of Aristotle is, that he died at the age of 60; later writers extend the period of his life considerably further, but their testimony is not equal in weight to that of Aristotle.

In E., philosophic thought is bound up with poetry and myth even in a higher degree than in Parmenides (q.v.). His general point of view is determined by the influence of the eleatic school upon the physical theories of the Ionic philosophers. He assumed four primitive independent substances—air, water, fire, and earth, which he designates often by the mythical names Zeus, Here, etc. These four *elements*, as they were called, kept their place till modern chemistry dislodged them. Along with material elements, he affirmed the existence of two moving and operating powers, love and hate, or friendship and strife, the first as the uniting principle, the second as the separating. The contrast between matter and power, or force, is thus brought out more strongly by E. than by previous philosophers. The origin of the world, or cosmos, he conceived in this way: In the beginning, the elements were held in a sort of blended unity, or *sphere*, by the attractive force of love; when hate, previously exterior, penetrated as a repelling and separating principle. In this process of separation, which gives rise to the individual objects of nature, he seems to have assumed a series of stages, a gradual development of the perfect out of the imperfect, and a periodical return of things to the elemental state, in order to be again separated, and a new world of phenomena formed. From the fragments that we possess of his didactic poem, it is not quite clear in how far he considered fire as the substratum of strife, and water as the substratum of love, and ascribed various creations to the predominance of one or the other of these principles. Of his opinions on special phenomena, may be mentioned his

doctrine of emanations, which proceeding from one thing enter into corresponding openings in other things. By this assumption in connection with the maxim, that like is known only by like, he thought to explain the nature of perception by the senses. He attempted to give a moral application to the old doctrine of the transmigration of souls, his views of which resembled those of Pythagoras. The fragments of E. have been edited by Sturz (2 vols., Leip. 1805), Karsten (Amst. 1838), and Stein (Bonn, 1852).

EMPEROR (Lat. *imperator*). The original signification of this, which in the modern world has become the highest title of sovereignty, can be understood only when it is taken in conjunction with *imperium*, which in the Roman political system had a peculiar and somewhat technical meaning. The *imperium* of a magistrate, be he king or consul, was the power which he possessed of bringing physical force into operation for the fulfillment of his behests. This power was conferred by a *lex curiata*, and it required this authorization to entitle a consul to act as the commander of an army. In the case of the kings also, the *imperium* was not implied in their election, but was conferred separately, by a separate act of the national will. "On the death of king Pompilius," says Cicero, "the *populus* in the *comitia curiata* elected Tullus Hostilius king, upon the rogation of an *interrex*; and the king, following the example of Pompilius, took the votes of the *populus*, according to their *curie*, on the question of his *imperium*."—*Republic*, ii. 17. Now, it was in virtue of this *imperium* that the title *imperator* was given to its possessor. Far from being an emperor in the modern sense, he might be a consul or a pro-consul; and there were, in fact, many *imperatores*, even after the title had been assumed as a prenominal by Julius Cæsar. It was this assumption which gradually gave to the title its modern signification. In republican times, it had followed the name, and indicated simply that its possessor was an *imperator*, or one possessed of the *imperium*; now it preceded it, and signified that he who arrogated it to himself was *the* emperor. In this form it appears on the coins of the successors of Julius. After the times of the Antonines, the title grew into use as expressing the possessor of the sovereignty of the Roman world, in which sense *princeps* also was frequently employed. In the introduction to the *Institutes*, Justinian uses both, in speaking of himself, in the same paragraph. From the emperors of the west, the title passed to Charlemagne, the founder of the German empire. When the Carlovingian family expired in the German branch, the imperial crown became elective, and continued to be so till it ceased—Francis II., who in 1804 had declared himself hereditary emperor of Austria, having laid it down in 1806. In addition to the emperor of Austria, there are now in Europe the emperor of Russia and emperor of Germany, the latter of whom, was, on Jan. 18, 1871, proclaimed under this title within the hall of mirrors, in the palace of the French kings at Versailles, in the presence of the German princes, and the standards of the German army which was beleaguering Paris. In 1876 the queen of England assumed the title of empress of India, in addition to those which she bore previously. See **EMPIRE**.

EMPEROR MOTH, *Saturnia pavonia minor*, a moth of the same family (*bombycidae*) with the silk-worm moth. The E. M. is the largest British lepidopterous insect. Its expanse of wings is about 3½ inches. Each wing is ornamented with a large eye-like glassy and transparent spot. The peacock moth (*S. pavonia major*) is the largest European species, and attains an expanse of 5 in. across the wings. The cocoons of the E. M. are remarkable for being formed internally of stiff convergent elastic threads, which readily permit the escape of the insect, but prevent the entrance of intruders. The cocoons of this genus of moths are invested with silk, which in China and India is collected for use. See **SILK** AND **SILK-WORM**.

EMPETRA'CEÆ. See **CROWBERRY**.

EMPHASIS. See **ACCENT**.

EMPHYSE'MA, an unnatural distension of a part with air. E. of the cellular texture often takes place in the neighborhood of wounds of the air-passages in the lungs, and is the consequence of an escape of air from these parts. E. of the lungs is the consequence either of distension or of rupture of the air-vesicles, especially on the surface. It is rarely that E. is produced otherwise than mechanically; but collections of fluid in a state of decomposition sometimes give out gases, which penetrate and distend the textures with which they are in contact.

EMPHYTEU'SIS (Gr. an implanting), in the Roman law, a perpetual right in a piece of land, for which a yearly sum was paid to the superior or original proprietor. The E. much resembled our feudal holdings, so much so, indeed, that Craig and other Scotch writers apply the term to them. The sum paid to the superior was called the *canon emphyteuticus*. The tenant handed down the right to his heirs, and was entitled to sell, but only on condition of giving the first offer to the dominus. The consent of the lord, however, was not necessary to entitle him to impignorate the *emphyteuta* for his debt. Justinian put the E. and the *ager vectigalis* on the same footing. The latter is the term applied to lands leased by the Roman state, by towns, ecclesiastical corporations, and by the vestal virgins. There were several ways in which the right of E. might cease. If the tenant died without heirs, it reverted to the dominus. He might also lose his right by injuring the property, by non-payment of his rent or public burdens, or by

alienation without notice to the dominus. It was, of course, also in his power to renounce it.

EMPIRE (see **EMPEROR**) denotes the territory and people whose sovereign bears the title of emperor or empress; a title which, since the time of Julius Cæsar, implies the possession of monarchical power in its highest form. During the middle ages and until a comparatively recent period the "Empire" in its strictest sense meant the "holy Roman empire" founded by Cæsar and Augustus, the last remnant of which was lost in 1806, when Francis II. of Hapsburg, archduke of Austria and king of Hungary and Bohemia, resigned his inherited imperial title and assumed that of emperor of Austria alone. The Roman empire, from A.D. 395, was divided into two parts, one of which was ruled from Rome, the other from Constantinople. In theory, however, the two were held to be parts of one empire, divided only for greater convenience of administration. This was fiction rather than fact, for the two parts were in perpetual conflict. An attempt to restore the unity of the two under Charlemagne, who in 800 was crowned emperor at Rome by pope Leo III., proved abortive. Two hostile lines of emperors arose, each claiming to be the one true succession from Augustus and Constantine. The imperial title fell low, until it was revived in the w. in 963 by Otto the great, from whose time there was an unbroken succession of German kings, who assumed the rank and right of emperors and were acknowledged as such by the church. Their power, however, did not extend beyond Germany and northern Italy, and it was hampered by many restrictions, which were aggravated as time went on, until after the peace of Westphalia, in 1648, when the empire was reduced to a mere federation of principalities and the imperial title became little better than a farce. The eastern empire was overthrown in 1453, when Constantinople was taken by the Turks. The empires now existing are those of Austria, Russia, Germany, Turkey, China, and Japan. The queen of England bears the title of empress of India.

EMPIRE STATE. See **STATES**, **POPULAR NAMES OF**.

EMPIRIC (Gr. *empeirikos*, an experimentalist, or searcher after facts in nature, from *peiraō*, I try). It is difficult to say at what period, or in what manner, this word began to degenerate from its original meaning. Probably the idea was, that empiricism, or experimental science, excluded, because it did not require, the reasoning faculties for its cultivation; and, therefore, the profession of empiricism came to be synonymous with vulgar ignorance. The empirics were a regular sect of ancient physicians in the time of Celsus and Galen, who give us some insight into their modes of thought and practice. They laid great stress on the unprejudiced observation of nature; and thought that, by a careful collection of observed facts forming a history, the coincidence of many observations would lead to unalterable prescriptions for certain cases. The later adherents of the school excluded all theoretical study, even that of anatomy, and were guided solely by tradition and their individual experience. By an E. in medicine is now understood a man who, from want of theoretic knowledge, prescribes remedies by guess according to the name of the disease or to individual symptoms, without thinking of the constitution of the patient or other modifying circumstances. What are called *specifics* are administered on this principle, or want of principle.

EMPIRICAL FORMULA, in chemistry, is the mode of expressing the constituents of a compound in symbols, where the total quantity of each element is written down without reference to any particular order or state of combination. Thus, alcohol consists of 2 equivalents of carbon, 6 of hydrogen, and 1 of oxygen; and its E. F. is C_2H_6O . When regarded, however, as a member of a family group, the constituents are arranged in a more systematic manner, as in $CH_3 \cdot CH_2 \cdot OH$, representing the theoretical constitution of alcohol, which, to speak with strictness, is the hydrate of ethyl. Again, the rational formula of Epsom salts, which is $MgSO_4 + 7H_2O$, represents it theoretically as a hydrated sulphate of magnesia; while the E. F. $MgH_{14}SO_{11}$ merely tells us that it consists of 1 equivalent of magnesium, 1 of sulphur, 14 equivalents of hydrogen, and 11 of oxygen.

EMPIRICAL LAWS are such as express relationships, which may be merely accidental, observed to subsist among phenomena, but which do not suggest or imply the explanation or cause of the production of the phenomena. They are usually tentative, and form stages in the progress of discovery of causal laws. Bode's law of the distances of the planets from the sun is an example of an empirical law.

EMPLOYERS' LIABILITY. See **FACTORY ACTS**, and **MASTER AND SERVANT**.

EMPOLI, a t. of Italy, is situated in the province of Florence, in a remarkably beautiful and fertile district on the left bank of the Arno, 16 m. w.s.w. of Florence. It is surrounded by walls flanked with towers. The most interesting building is the Collegiate church, built in 1093.

EMPORIA, city and co. seat of Lyon co., Kan.; between Cottonwood and Neosho rivers; on the Missouri, Kansas and Texas, and the Atchison, Topeka and Santa Fé railroads; 61 m. s.w. of Topeka. It contains churches, national banks, flour-mills and manufactories; a State Normal School, College of Emporia, excellent schools, business college, conservatory of music, gas and electric lights, water-works owned by the city, etc. The surrounding country is a fertile prairie. Pop. '90, 7551.

EMPORIUM (Gr. *emporion*, trading-place). The word is derived from *emporos*, which signified in Homer's time a person who sailed in a ship belonging to another, but latterly meant a wholesale merchant, as opposed to a retailer, who was called *kapēlos*. An *E.* thus came to be applied to the receptacles in which wholesale merchants stowed their goods in seaports and elsewhere, and thus corresponded to our warehouses, as opposed to a shop.

EMPTION. See **SALE OF GOODS**.

EMPYEMA (Gr.), an internal suppuration, a word now applied exclusively to a collection of pus in the pleura, causing pressure of the lung, and often attended by hectic fever. See **PLEURISY**.

EMPYREU MA (Gr. *empyreuo*, I kindle), the burned smell and acrid taste which result when vegetable or animal substances are decomposed by a strong heat. The cause of the smell and taste resides in an oil called *empyreumatic*, which does not exist naturally in the substance, but is formed by its decomposition.

EMS, a river in the n.w. of Germany, rises in Westphalia, at the southern base of the Teutoburger Wald, and flowing first in a north-western, and then through the Hanoverian territories in a northern direction, empties itself into Dollart bay, an estuary of the German ocean, after a course of 200 miles. Its chief affluents are the Aa, the Haase, and the Leda. It is navigable for vessels of 100 tons as high as Pappenburg, which is 25 m. up the river from Dollart bay. The *E.* drains a basin of about 5,000 sq. m. in extent. In 1818 it was connected by canal with the Lippe, and with the Jade.

EMS, usually called the *Baths of Ems*, to distinguish it from other places of the same name, a bathing-place known to the Romans, and celebrated in Germany as early as the 14th century. It is situated about 4 m. from Coblenz, near the most picturesque parts of the Rhine, in a beautiful valley in the province of Hessen-Nassau, traversed by the navigable river Lahn, and surrounded by wooded hills. Pop. '90, 5472. Its warm mineral springs belong to the class containing soda; the only essential difference between the numerous springs is in the temperature varying from 24° to 46° Reaumur, and in the greater or lesser amount of carbonic acid gas contained in them. The bathing establishments are comfortably and luxuriously fitted up, as are also the hotels and private lodging-houses.

EMSER, HIERONYMUS, 1477-1527; a Roman Catholic theologian of Germany, distinguished as an opponent of Martin Luther. His most notable exploit was the publishing of a translation of the New Testament which he claimed as his own work, though it was really a reprint of Luther's translation with some slight alterations.

EMU (*Dromaius*—or *dromecius*—*Novæ Hollandiæ*), a very large bird, one of the *struthionidæ* or *brevipennes*, a native of Australia, and widely diffused over the southern parts of that continent and the adjacent islands. It is by some ornithologists referred to the same genus with the cassowary, but the differences are very considerable; the bill being horizontally depressed, whilst that of the cassowary is laterally compressed, the head feathered, and destitute of bony crest; the throat is nearly naked, and has no pendent wattles; the feet are three-toed as in the cassowary, but the claws are nearly of equal length. The name *E.* or *emue* was given by the older voyagers and naturalists to the cassowary, but is now the invariable designation of the Australian bird. The *E.* is even taller than the cassowary, which it resembles in the general character of its plumage. Its wings are mere rudiments hidden beneath the feathers of the body. Its color is a dull brown, mottled with dingy gray; the young are striped with black. When assailed, it strikes backwards and obliquely with its feet, like the cassowary, and it is so powerful that a stroke of its foot is said to be sufficient to break a man's leg. Dogs employed in hunting it are often injured by its kicks, but well-trained dogs run in before it, and spring at its neck. It cannot fly, but runs very fleetly. It is timid and peaceful, and trusts altogether to its speed for safety, unless hard pressed. In a wild state, it sometimes occurs in small flocks; but it has now become rare in and around all the settled parts of Australia. The extinction of the species may, however, perhaps be prevented by its being preserved in a state of domestication; as its flesh is excellent, and it is very easily domesticated, and breeds readily in that state. It has frequently bred in Britain. The eggs are six or seven in number, dark green; the male performs the principal part of the incubation. The eggs are highly esteemed as food. The skin of the *E.* contains much oil—six or seven quarts are obtained from a single bird, and on this account it has been much hunted in Australia. The food of the *E.* consists chiefly of roots, fruits, and herbage. Its only note is a drumming sound, which it frequently emits.

EMULSINE, or **SYNAPTASE**, is a peculiar ferment present in the bitter and sweet almond, and which forms a constituent of all almond emulsions. When bitter almonds are bruised, and water added, the *E.* acts as a ferment on the amygdalin, and decomposes the latter into volatile oil of bitter almonds, prussic acid, grape-sugar, formic acid, and water (see **ALMONDS**, **VOLATILE OIL**, or **ESSENTIAL OIL OF**). The vegetable albumen of almonds is almost entirely composed of *E.*; which, when separated, is a white substance, soluble in water, and is distinguished by its remarkable power of

causing the fermentation of amygdalin. It consists of carbon, hydrogen, nitrogen, and oxygen.

EMULSION is the term applied to those preparations in pharmacy obtained by triturating certain substances with water, and where the product is a milky white opaque mixture of a gummy consistence, and composed more or less of oily particles floating in mechanical suspension in the mucilaginous liquid. The *true* and *oily* emulsions are those containing true oil, as the E. of bitter almonds, obtained by bruising the latter in a mortar with water; and the *false*, or *not oily*, where no true oil is suspended, as where camphor, balsams, or resins are rubbed up with yolk of egg, mucilage, or dilute spirit of wine.

EMYDÆ, a genus of marsh tortoises, from which the whole family of marsh tortoises is sometimes called *emydæ*. The chelonians of this family are numerous, and widely diffused throughout the warmer parts of the world. They differ more in their habits than in their appearance and structural characters from land tortoises. Their carapace, however, is more flattened, and their feet are more expanded and webbed, so that they swim with great facility. They feed chiefly on animal food, as insects and mollusks, aquatic reptiles, and fishes, some of them even preying upon birds and mammalia which come within their reach. Two or three species of *emydæ* are natives of the s. of Europe; but two species are particularly abundant in North America, the painted tortoise (*emys picta*), and the alligator tortoise (*emysaura serpentina*). The flesh of some, as *cistudo Europæa*, is esteemed for food. This small species, about 10 in. long, an inhabitant of lakes, marshes, and muddy places in the s. and e. of Europe, is sometimes kept in ponds, and fattened for the table on lettuce-leaves, bread, etc.

ENALIOSAURIANS (Gr. marine lizard), an order of fossil marine saurians commencing in the carboniferous, and ending in the cretaceous periods, being most abundant in the jurassic. They have biconcave vertebræ, like those of fishes, teeth like those of crocodiles, a lizard body, and the paddles of cetaceans instead of true feet, an apparently incompatible combination. Some had long snake-like necks, and most of them were of great size, and must have been exceedingly voracious. They comprise two groups, the ichthyosaurians and simosaurians. The ichthyosaurians belong to the jurassic and cretaceous formations, while the simosaurians have been found only in the triassic. The two principal genera of the ichthyosaurians are the ichthyosaurus and the plesiosaurus, and they are the most generally known. See **ICHTHYOSAURUS** and **PLESIOSAURUS**.

ENAMEL (Fr. *émail*, originally *esmail*, from the same root as *smelt*), the name given to vitrified substances of various composition applied to the surface of metals. Enameling is practiced (1) for purposes of utility, as in making the dial-plates of watches and clocks, coating the insides of culinary vessels, etc., when it may be considered as belonging to the useful arts; and also (2) for producing objects of ornament and beauty—artistic designs, figures, portraits, etc., when it belongs to the fine arts. Both the composition of enamels and the processes of applying them are intricate subjects, besides being in many cases kept secret by the inventors; and we can only afford space for the most general indications of their nature. The basis of all enamels is an easily fusible colorless silicate or glass, to which the desired color and the desired degree of opacity are imparted by mixtures of metallic oxides. The molten mass, after cooling, is reduced to a fine powder, and washed, and the moist paste is then usually spread with a spatula upon the surface of the metal; the whole is then exposed in a surface (*fired*, as it is called) till the E. is melted, when it adheres firmly to the metal. The metal most commonly used as a ground for E. is copper; but for the finest kinds of enamel-work gold and silver are also used.

Artistic or Ornamental Enameling.—This art is of great antiquity: it is proved by the remains found in Egypt to have been practiced there; from the Egyptians it passed to the Greeks, and it was extensively employed in decoration by the Romans; in the reign of Augustus, the Roman architects began to make use of colored glass in their mosaic decorations; various Roman antiquities, ornamented with E., have been dug up in Britain, and it was adopted there by the Saxons and Normans. A jewel found at Athelney, in Somersetshire, and now preserved in the Ashmolean museum at Oxford, is proved by the inscription on it to have been made by order of Alfred; and there are various figures with draperies partly composed of colored E. on the sides of the gold cup given by king John to the corporation of Lynn, in Norfolk.

Enameling has been practiced from a remote period in the east, Persia, India, and China, under a separate and distinct development; but there is nothing from which it can be inferred that the various methods were in use earlier than in Europe. As a decoration, enameling was more popular, and attained to greater perfection in the middle ages than in classic times. It was extensively practiced at Byzantium from the 4th until the 11th c., and afterwards in Italy in the Rhenish provinces, and at Limoges in the s. of France, where it was successfully followed out till a comparatively late period, in several different styles. The Byzantine and other early styles of enamel-work down to the 17th c. were generally employed in ornamenting objects connected with the service of the church, such as reliquaries, pyxes, church-candlesticks, crosiers, portable altars, the frontals of altars, etc.; the art was also greatly used in ornamenting jewelry, and

vessels made for use or display in the mansions of the rich, such as salt-cellars, coffers, ewers, plateaux, candlesticks, etc. After this period the art declined, until a new phase of it was invented in France, in which E. is used as a ground, and the figures are painted with vitrified colors on the surface of it. This is enamel-painting properly so-called, the earlier styles being more of the nature of mosaics.

Distinguished with reference to the manner of execution, enamel-work may be divided into four kinds: 1. *Cloisonée*, or inclosed, the method of the Byzantine school, in which the design is formed in a kind of metal case, generally gold or copper, and the several colors are separated by very delicate filagree gold bands, to prevent them running into each other. 2. *Champ Levé*, practiced by the early Limoges school. In this process the ornamental design, or the figures that were to be filled in with color, were cut in the metal (generally copper) to some depth; and wherever two colors met, a thin partition of the metal was left, to prevent the colors running into each other by fusion when fired. 3. Translucent E., which had its origin, and was brought to great perfection in Italy, was composed of transparent E. of every variety of color, laid in thin coatings over the design, which was incised on the metal, generally silver, the figure or figures being slightly raised in low relief, and marked with the graver, so as to allow the drawing of the contours to be seen through the ground, instead of being formed by the coarse lines of the copper, as in the early Limoges enamels. 4. Surface-painted enamels, which may be divided into two stages. The first stage, which is known as the *late Limoge* style, sprang up under Francis I. of France (1515-47). In this the practice was to cover the metal plate with a coating of dark E. for shadows, and to paint on this with white, sometimes set off with gold hatchings, sometimes having the hands and other parts of the figures completely colored. The designs were generally taken from well-known paintings or engravings of the period; and the style of the designs was strongly influenced by that of the Italian artists employed by Francis I. This style soon degenerated, and gave place to the latest or *miniature* style, which was invented before the middle of the 16th c. by Jean Toutin, a goldsmith at Chateaudun, and carried to the highest perfection by Jean Petitot, a miniature-painter, who was born at Geneva, 1607, and afterwards resided long in England, and then in Paris. In this the plate is covered with a white opaque E., and the colors are laid on this with a hair-pencil, and fixed by firing. The paints are prepared by grinding up colored enamels with some kind of liquid, and when fused by the heat, they become incorporated with the E. of the ground. The earlier enamellers of this school occupied themselves with miniatures, snuff-boxes, and other trinkets, till the period of the French revolution, when the art fell into disuse. It was, however, revived in England early in this century; and copies of portraits and pictures on a much larger scale than the French miniatures were executed with much success by the late H. Bone, R.A., and the late Charles Muss. Works of this description possess the obvious advantage of durability; but those various qualities of texture, and the delicacy of color for which good works in oil or water-color are prized, cannot be attained in E. copies; and it is to be regretted that greater efforts are not made to turn enameling to account in the way of ornamentation, for which it is so admirably fitted, rather than in attempts at imitating works classed strictly as within the bounds of fine art, and to put in practice the older styles of enameling, particularly those denominated *champ levé* and transparent enameling.

Enameled-ware.—The liability of iron to oxidation by heat or moisture, and to corrosion even by the weakest acids, has led to many attempts to coat it with a protecting surface. Ordinary tin plate is the oldest and most familiar example of a partially successful method. Since the beginning of the present century, many attempts have been made to cover iron with a vitreous surface, and several patents have been taken for such methods of enameling. The chief difficulty in applying enamels to iron arises from the tendency of the metal to oxidize before it reaches the temperature at which the E. fuses, and to become brittle from the oxide combining with the silica of the enamel. This action being superficial, the mischief is the greater in proportion to the thinness of the iron. Therefore it is much easier to E. thick cast-iron vessels than thin vessels made of sheet-iron. A glass may be made by combining either silicic acid or boracic acid with a base; the latter fuses at a lower temperature than the former, but the glass is much dearer and not so durable as the silica glass. The enamels used for coating iron consist of a mixture of silica and borax, with various basic substances, such as soda, oxide of tin, alumina, oxide of lead, etc.

The best E. for such purposes with which we are acquainted, is that patented by C. H. Paris, and applied by Messrs. Griffiths and Browett of Birmingham. It consists of 130 parts of flint-glass powdered, 20½ parts of carbonate of soda, 12 of boracic acid. These are fused together to form a glass, then reduced to a very fine powder; the article to which they are to be applied is carefully cleaned with acid, then brushed over with gum water, and the powder dusted upon it. The gum water is merely to cause adhesion. This coating is then carefully dried, and heated just to the point at which the powdered glass will fuse, and by running together, coat the surface. The E. is generally put on in two separate layers or coatings, the first being dull gray, and the second or outer one of some brighter color. For sheet-iron hollow-ware, the latter is usually white, upon which a pattern is often printed with transfer paper by the process in use for earthenware (see POTTERY). These light enameled iron vessels, from their being practically

indestructible (except when used for cooking), are made in large numbers for use on board ships, and for colonial markets. A great variety of articles, many of them beautifully decorated in colors, such as grate-fronts, clock-dials, panels of different kinds, tablets, and name-plates, are now executed in enameled iron at a comparatively moderate cost. It is also applied to corrugated roofing. See HOLLOW-WARE.

ENAMEL OF TEETH. See TEETH.

ENARËA, a country of Africa, s. of Abyssinia, is situated within lat. 7° to 9° n., and long. 36° to 38° e., but its limits have not yet been definitely ascertained. It is inhabited by a portion of the Gallas tribes, who, owing to the continued communication which they keep up with Abyssinia, and also to the residence of many Mohammedan merchants among them, are much more civilized than the Gallas usually are. Their government is a hereditary and absolute monarchy. The principal rivers of E. are the Gibbe and the Dodesa. The capital is Saka.

ENARTHROSIS is the term used by anatomical writers to express the kind of joint (q.v.) which admits of the most extensive range of motion. From this mode of connection and the form of the bones in this articulation, it is commonly called the ball-and-socket joint. It occurs in the hip and shoulder joints.

ENCÆNIA, dedication festivals held by the early Christian church on the occasion of consecrating a heathen temple to Christian use, and afterwards held on the anniversaries of such occasions. At first they were very simple but about the beginning of the seventh century they became more elaborate, and included dramatic presentations, singing and dancing, until their proceedings met with disapproval from the Council of Chalons. In later times, the festivals held at Oxford and Cambridge in honor of their founders were called *Encænias*.

ENCAMPMENT. See CAMP.

ENCAUSTIC PAINTING (Gr. *encaustikē*, infired, or fixed by fire), a manner of painting practiced by the ancients. As the name implied that fire was used in the execution, some have been led to suppose that E. P. was the same as enamel painting; but notices by Pliny and other writers show clearly that it was a species of painting in which the chief ingredient used for uniting and fixing the colors was wax dissolved by heat. Various attempts have been made in modern times to revive it. About the middle of last century, count Caylus and M. Bachelier, and in 1792, Miss Greenland, made various experiments with this view. The count laid the result of his experiments before the academies of painting and of sciences in Paris; and the ingenious lady was rewarded with a gold pallet by the society for the encouragement of arts in London; but the success of these efforts seems to have been but temporary. E. P. was, however, some years ago again taken up in Germany under the patronage of the late king of Bavaria, who had a number of important works executed in this way. The colors are ground, and laid on with a vehicle composed principally of wax. Miss Greenland dissolved gum-arabic in water, afterwards adding gum-mastic, which was dissolved by stirring and boiling, and when the mixture had reached the boiling-point, she put in the wax. After painting the picture, she passed a thin coating of melted wax over it with a hard brush, and then drew over the surface an iron—for ironing linen—moderately heated. After the picture cooled, it was rubbed with a fine linen cloth. The German method is somewhat similar, but some other ingredients are used; among these, potash with the wax; and in place of an iron being passed over the surface, the wax is brought to the surface by a vessel containing fire being held at a little distance from the picture. E. P. is not likely to come into general use, for neither in imparting brilliancy to the colors, facility for execution, nor durability, is it to be compared with oil-painting.

ENCAUSTIC TILES, ornamental tiles made of earthenware, and now extensively used for paving churches, halls, conservatories, etc. Strictly speaking, the name applies only to tiles with a pattern produced by layers of different-colored clays; but we may also include those made of a single color where two or more kinds go to form a pattern. Of course a mosaic can thus be formed with tiles of various forms as well as colors. Tiles of one color are made of dried slip—that is, the powder of carefully mixed and prepared clay. These “dry tiles” are made by placing the colored clay powder in strong steel molds, and subjecting it to a pressure of several hundred tons, by means of a plunger fitting accurately into the mold. A depth of 3 in. of powder is compressed into a tile of 1 in. in thickness. It is then removed, heated in a hot chamber, fired, and glazed if required.

The figured tiles are made in a different manner. The clay is worked in a moist state, but very stiff, first into square blocks. These are cut into square slices or slabs by passing a wire through them; upon this is put a facing of fine clay of the color of the ground of the pattern—another layer, of a different quality of clay, is sometimes added to the bottom, to prevent warping. It is then placed in a mold, with a plaster-of-Paris slab forming the top, on the under surface of which is the pattern in relief. This slab is pressed down, and thus forms a deep impression of the pattern which is to be produced in another color. The clay of the requisite color to form the pattern is now poured, in a semi-fluid state, into this depression, and allowed to flow over the whole face of the tile; then it is set aside until dry enough to have its surface scraped and smoothed on a whirling table. By this means the superfluous clay is removed, and the pattern is

brought out clear and well-defined, the two colors of clay forming one smooth flat surface. The tile is then dried and fired.

By Malkin's patent process, inlaid as well as plain tiles are now wholly made of dried slip. The pattern is produced by the use of brass plates one eighth of an inch thick, a separate one being used for each color. Thus, if it consist of an ornament in red and white on a blue ground, one plate is perforated so as to enable the red portion of the clay powder to be filled in, another is cut for the white portion, and a third for the blue ground. When all are filled up, the tile is pressed in a screw-press and fired.

Tiles of this kind were used for paving churches in England and on the continent from the 12th to the 15th c., after which they fell into disuse. The modern manufacture is therefore nothing more than a revival, with some improvements, of an ancient art.

ENCEINTE (Fr.), in fortification, denotes generally the whole area of a fortified place. Properly, however, it means a cincture or girdle, and in this sense the *enceinte* signifies the principal wall or rampart encircling the place, comprising the curtain and bastions, and having the main ditch immediately outside it.

ENCEPHALOCELE (derived from the Gr. *encephalon*, the brain and *cele*, a tumor), is the term applied to a tumor projecting through the skull, in one of the parts where the bones are incomplete in infancy, and consisting of a protusion of the membranes of the brain, containing a portion of brain itself. The most common situation of such tumors is in the middle line and at the back of the head. Surgical interference is scarcely ever justifiable, and all that can usually be done is to give uniform support to the tumor, and to defend it from injury.

ENCHON DROMA is the term employed in pathological anatomy to signify an abnormal cartilaginous growth. These growths most commonly occur in connection with the bones, and they are not unfrequent in some of the glandular structures. See **TUMORS**.

ENCHORIAL CHARACTERS. See **HIEROGLYPHICS**.

ENCINA, OR ENZINA, JUAN DEL, 1469-1534; the father of the Spanish drama, educated at Salamanca. About the close of the century he began to exhibit dramas of his own construction, in which he sometimes played low comedy parts. Early in the 15th c. he went to Rome and joined the priesthood. He visited Jerusalem, and published an account of his journey. His dramatic works mark the transition from the purely religious to the secular stage.

ENCINAL, a co. in s. Texas; unorganized and attached to Webb co. for judicial purposes; crossed in n.e. corner by Nueces river; surface uneven; land uncultivated, and used for pasturage; 1700 sq.m. Pop. '90, 1022.

ENCKE, JOH. FRANZ, the well-known astronomer, was b. Sept. 23, 1791, at Hamburg, where his father was a clergyman. After studying at Göttingen, he served, during the campaign of 1813-14, in the artillery of the Hanseatic legion, and in 1815, in the Prussian army, as lieut. of artillery. On the establishment of peace, he left the service, and became assistant, and afterwards principal astronomer in the observatory of Seeberg, near Gotha. In 1825, chiefly at the instigation of Bessel, he was called to Berlin as successor to Tralles, in the secretaryship of the academy of sciences, and as director of the observatory. While at Gotha, the astronomical prize offered by Cotta was awarded to E. by the judges Gauss and Olbers, for his determination of the orbit of the comet of 1680. This led him to solve another problem, which had been proposed along with the other—viz., the distance of the sun. The solution, by means of the two transits of Venus in 1761 and 1769, is published in two separate tracts (*Die Entfernung der Sonne*, Gotha, 1822-24). In 1819, he proved that the comet discovered by Pons, Nov. 26, 1818, revolved in the hitherto incredibly short period of about 1200 days, and had been already observed in 1786, 1795, and 1805. It has since gone by the name of E.'s comet, and has appeared regularly; the period of its recurrence being 3.29 years, or about $3\frac{3}{10}$ years. See **COMET**. E.'s researches on this subject are contained in the *Transactions of the Berlin Academy*. In 1830, he undertook to edit the *Berlin Astronomical Almanac*, in which he published a number of astronomical treatises. Three volumes have appeared of *Astronomical Observations at the Berlin Observatory*, begun in 1855. He died 26th Aug., 1865.

ENCORE ("Again"), a French expression, generally used in England by the audience of a theater or concert-room, when requesting the repetition of the performance of a piece of music. It is not used by the French themselves, who, in similar circumstances, exclaim *bis* (twice).

ENCRATITES, the name of early ascetics in the Christian church, who forbade marriage, the eating of the flesh of animals, and the use of wine, going so far as to substitute water for wine in the eucharist.

ENCRI'NAL, OR ENCRIN'ITAL, LIMESTONE, a name given to some carboniferous limestones, from the great abundance in them of the calcareous skeletons of encrinites (q.v.), whole masses of the rock being almost entirely composed of them. There are large beds in the Hamilton and Helderberg groups in New York state.

ENCRINITES, a name applied generally to the fossil crinoidea, a family of echinodermata (q.v.). The popular name, *stone lilies*, is given to the numerous fossil species.

from the resemblance which many of them present when the rays are closed to the lily. Hence also the name *crinoidea*. Crinoids are characterized by having their bodies supported, during the whole or part of their existence, on a longer or shorter jointed calcareous stem. The stem is attached either by the expanded base, or by jointed processes, to the rocky bed of the sea, or perhaps, in some cases, to floating bodies, like barnacles. Occasionally, numerous root-like side-arms are sent out from the base of the stem to strengthen and support it; and in some species, as in the recent *pentacrinus*, the column throughout its length is furnished with axillary side-arms. The stem is round or five-sided; in one genus only is it elliptical. It is composed of a number of joints, perforated in the center, for the passage of a soft portion of the animal, and beautifully sculptured on the articulating surfaces. The body is cup-shaped, and composed of many-sided plates on the under surface, to the center of which the stalk is attached, while the upper surface is covered with a coriaceous skin, protected by many small plates. On this was situated the mouth, which was frequently probosciform, and near it was the anal orifice—the alimentary canal being turned upon itself, as in the bryozoa. The arms spring from the edges of the cup. They are five in number at their origin, but, with few exceptions, speedily divide and subdivide dichotomously. The arms are composed of articulated calcareous joints, similar to those of the stems. Each joint is furnished with two slender-jointed appendages or cirri, of use to the animal in capturing its prey, which consisted of mollusca and other small animals. The number of joints in some species is truly amazing. Dr. Buckland calculated that *pentacrinus briareus* consists of at least 150,000; and “as each joint,” according to Carpenter, “was furnished with at least two bundles of muscular fiber—one for its extension, the other for its contraction—we have 300,000 such in the body of a single *pentacrinus*, an amount of muscular apparatus far exceeding anything that has elsewhere been observed in the animal kingdom.”

The family commenced its existence with the earliest sedimentary deposits. Seventy-three genera have been described, containing upwards of 300 species, two thirds of which are found only in paleozoic rocks. The most ancient E. have nearly all round stems, the few that are five-sided having the articulated surface of the joints simply radiated, and not complexly sculptured as in *pentacrinus*, the type of a division of the order which appears first in the lias. The earlier seas literally swarmed with these animals. “We may judge,” says Dr. Buckland, “of the degree to which the individual crinoids multiplied among the first inhabitants of the sea, from the countless myriads of their petrified remains which fill so many limestone beds of the older formations, and compose vast strata of entrochal marble, extending over large tracts of country in Northern Europe and North America. The substance of this marble is often almost entirely made up of the petrified bones of encrinites.” See CRINOIDEÆ; and illus., MUSCHELKALK PERIOD, Vol. X.

ENCUMBRANCE. See INCUMBRANCES.

ENCYCLICAL LETTERS. (Gr., *encyklius*, “circular,” “periodical,” “general.”) This term denotes in a general sense, circular ecclesiastical letters, whether from a council, bishop or pope. In the early church the letters sent by the member of a council to all the churches, or by a bishop to all the churches of a particular circuit, were so called; but the term is now applied exclusively to letters addressed by the Pope to all the bishops of the Roman Catholic church, which usually contain injunctions, and warnings against dangers which may threaten the church. One of the most recent encyclicals was issued by Pope Leo XIII. in 1888, on the subject of socialism.

ENCYCLOPÆDIA means properly a book or work professing to give information, more or less full, on the whole circle of human knowledge. The name is compounded of two Greek words, *enkyklios*, circular or general; and *paideia*, discipline or instruction. These words were used by the Greeks and Romans to signify the circle of instruction through which every free-born youth had to pass before entering on public life. That circle embraced more particularly grammar, music, geometry, astronomy, and gymnastics, and afterwards became the “seven liberal arts” of the middle ages. The compound name E. appears to have been unknown to the Greeks, and also to the Latin writers of the classic period; and there is no evidence that either Greeks or Romans ever applied the words, single or compounded, to designate a book. The short form *Cyclopædia* has still less classical authority than *encyclopædia*.

Encyclopædias, in the modern sense of the word, are most commonly alphabetical; but sometimes the arrangement is “rational,” i.e., according to the natural relations of the subjects. An alphabetical E. is a dictionary of universal knowledge. Besides this, its proper meaning, of a repertory of universal knowledge, the name E. is often applied—less properly perhaps—to alphabetical works whose scope is limited to a particular branch—works differing in no respect from others which are styled dictionaries, gazetteers, etc. See DICTIONARY. As all works of this kind, which now form a large and increasing section of literature in every language, have in so far a common character with encyclopædias proper, we may give some account of the whole class under the present head.

For the sake of convenience, they may be arranged in three divisions: 1. The earlier works of this kind, having, for the most part, merely an encyclopædic character, i.e., embracing a large range of subjects, without distinctly aiming at universality; 2. Ency-

clopædias proper, which treat of the whole circle of human knowledge; 3. Books professedly confined to a definite department of knowledge, whether under the name of E., dictionary, gazetteer, or other title. As books of this class profess to touch on every important point that comes within their scope, they may be considered as encyclopædic in a limited sense. In the following sketch, the distinction between the first and second of those classes, which is of a somewhat indeterminate kind, is not strictly adhered to when it would interfere with the chronological sequence.

1. The earliest work of an encyclopædic character is generally ascribed to Speusippus, a disciple of Plato. The great collections of Varro (*Rerum Humanarum et Divinarum Antiquitates* and *Disciplinarum libri ix.*), of the elder Pliny (*Historia Naturalis*), of Stobæus, of Suidas, of Isidorus (the *Origines*), and of Capella, belong to the same class, but they exhibit no plan, and are only confused accumulations of the then known arts and sciences. Vincent of Beauvais (1264) surpassed them all. He gathered together with wonderful diligence the entire knowledge of the middle ages in three comprehensive works, *Speculum Historiale*, *Speculum Naturale*, and *Speculum Doctrinale*, to which soon after an unknown hand added a *Speculum Morale*. But these, as well as the other similar compilations which appeared in the later mediæval period under the title of *Summa*, or *Speculum* (mirror), are marked throughout by a lack of philosophic spirit. Perhaps the nearest approach to the modern E. by an ancient writer, dates two centuries earlier than the time of Beauvais. In the 10th c., flourished Alfarabius, the ornament of the school of Bagdad, who wrote an encyclopædic collection of knowledge, remarkable for its grasp and completeness, and which still lies in MS. in the Escorial of Spain. Among the earliest and most noted of the modern encyclopædias was that of Johann Heinrich Alsted, or Alstedius, which appeared in Germany in two volumes in 1630. It consisted of 35 books in all, of which the first four contained an explanation of the nature of the rest. Then followed six on philology, ten on speculative and four on practical philosophy; three on theology, jurisprudence, and medicine; three on the mechanical arts; and five on history, chronology, and miscellaneous topics. Two important French works belong to this century—the one is Louis Moreri's *Grand Dictionnaire Historique et Critique*, of which the first edition appeared at Paris in 1673, and the last in 1759; the other, Peter Bayle's famous *Dictionnaire Historique et Critique*, published at Rotterdam, in 4 vols., 1697. The first encyclopædic dictionary, so far as known, appeared in Germany as the *Lexicon Universale* of Hoffmann (2 vols., Basel) in 1677. Some time after there appeared in France, Thomas Corneille's *Dictionnaire des Arts et des Sciences*, 2 vols. (Paris, 1694). Dictionaries limited to the explanation of technical terms had long been common throughout Europe; but previous to Hoffmann's work, no attempt had been made to bring the whole body of science and art under the lexicographic form. A highly successful attempt identical in kind, and attributable in idea, it may be, to the German work just alluded to, was the *Lexicon Technicum* of Dr. Harris, 2 vols. folio (London, 1710), which may fairly be regarded as the parent of all the dictionaries of arts and sciences that have since appeared in England. The *Cyclopædia* of Ephraim Chambers, published in 1728, in two very large folio volumes, presents the next marked advance in the construction of encyclopædical dictionaries. This one was brought out with considerable claims to originality of arrangement. The author endeavored to communicate to his alphabetical materials something of the interest of a "continuous discourse," by an elaborate system of cross references. Another peculiarity of this cyclopædia was that its author, in the details of mathematical and physical science, gave only conclusions and not processes of demonstration. It was long a very popular work. The largest and most comprehensive of the successors to Hoffmann's book in Germany, was Zedler's *Universal Lexicon*, 64 vols. (Leip. 1732-50). In point of comprehensiveness, this work should be classed with the encyclopædias proper, there being almost nothing then known that may not be found in it. Perhaps the strongest impulse, if not in all respects the best, communicated by this successful attempt of Ephraim Chambers, was given to the French mind through D'Alembert and Diderot. Their *Encyclopédie* was really, though not professedly, founded upon E. Chambers's book, which an Englishman named Mills had translated between 1743 and 1745, though the French version of it never was published. The great French *Encyclopédie* was written by various authors of high literary and philosophical attainments, but of whom nearly all were tainted too much with the most impracticable revolutionary ideas, besides holding for the most part extremely skeptical opinions. The *Encyclopédistes* excluded both biography and history from its scope, yet infused into it more originality, depth, and ability, than ever had appeared before within the boards of an encyclopædical dictionary. It appeared at Paris in 28 vols. between the years 1751-72, and was followed by a supplement in 5 vols. (Amst. 1776-77), and an analytical index in 2 vols. (Paris, 1780). The work was everywhere received with the greatest enthusiasm, and it secured a place in the literary history of the nation for the editors and principal writers, who are ordinarily known as the *Encyclopédistes* of France. They were D'Alembert and Diderot the editors, Rousseau, Grimm, Dumarsais, Voltaire, baron d'Holbach, and Jancourt. [See La Porte's *Esprit de l'Encyclopédie* (Paris, 1768); and Voltaire's *Questions sur l'Encyclopédie* (Paris, 1770).] D'Alembert's celebrated preliminary discourse was garbled in various pretentious works of this class published for the most part in England; such were Barrow's *New and Universal Dictionary of Arts and Sciences*, 1 vol. folio, 1751; and the *Complete Dictionary of Arts*

and Sciences, by Croker, Williams, and Clerk, 3 vols. folio, 1766. A somewhat better, though rather illogical performance was published by a "Society of Gentlemen" in 1754 in four 8vo vols., generally known as *Owen's Dictionary*, from the name of the publisher of it. The first rude outline of the ponderous and solid *Encyclopædia Britannica* was laid down in the year 1771, in three volumes, but it was nothing more than a dictionary of arts and sciences; it had not yet attained to its subsequent universality. Such is a brief outline of the earlier kind of encyclopædies.

2. The first E. proper that demands our attention is the *Encyclopædia Britannica*, of which the 2d comparatively complete edition, containing biographical and historical articles, appeared in 10 vols., between 1776 and 1783; the 3d edition was completed in 18 vols. in 1797; the 4th edition, in 20 vols., in 1810; the 5th and 6th editions, and supplements, in 6 vols., appeared between 1815-24; the 7th edition in 21 vols., in 1830-43; the 8th edition, in 21 vols., 1852-60; and a 9th edition was completed, 1889. The method pursued by this work, while thoroughly alphabetical, consists in a combination of the systematic and the particular. In few instances is any science broken up into fractional parts; nearly all the sciences are given in treatises as they severally occur in the order of the alphabet. In some cases, however, where obscurity might result from such a plan, the other method is adopted. A marked feature of this work, is the number of complete treatises and dissertations which it contains by men of European name. From first to last, this E. has been executed and published in Edinburgh, the literary reputation of which it has helped in no small degree to increase. The next E. that we must notice is the *Encyclopédie Méthodique par Ordre des Matières*, which was begun in 1782, and was not finished till 1832. It extends to 166½ vols. of text, with 51 "parties," containing 6,439 plates. Each subject is treated in a separate volume or series of volumes, so that the work is a collection of separate dictionaries, more extensive than any encyclopædic work that has yet appeared. A work of higher scientific value, however, and even of a more varied nature, has been in progress for nearly half a century in Germany, undertaken originally by Professors Ersch and Gruber in 1818, and which has since continued to appear, in three several sections of the alphabet, up to the present time. There have already appeared of this great *Allgemeine Encyclopädie der Wissenschaften und Künste* some 150 volumes. In 1802, Dr. Abraham Rees projected an extended and improved edition of Ephraim Chambers's *Cyclopædia*, which was completed in 45 volumes in 1819. The system of cross-references peculiar to E. Chambers is very effectually carried out in this book; but besides including a great accession of historical and biographical detail, it contained a large number of papers, prepared by competent writers, on subjects with which their life had rendered them familiar. Another work of considerable merit, which began to appear in 1810, was Brewster's *Edinburgh Encyclopædia*, edited by the late sir David Brewster, and completed in 18 vols., in 1830. In 1812, a great impetus was given to encyclopædic publications, by the appearance of the *Conversations-Lexicon* of F. A. Brockhaus, of Leipsic. It has since gone through fifteen editions. The eleventh issue, in 15 vols., appeared between 1864 and 1868 (supplement, 1872-73). The thirteenth edition appeared in 1888. This work has been translated into nearly all the civilized languages of Europe, no fewer than four English works of the kind being professedly founded on it: these are the *Encyclopædia Americana*, in 14 vols. (Philadelphia, 1829-46); the *New American Encyclopædia*, 16 vols. (New York, 1858-63), of which a new ed. under the title *American Cyclopædia* appeared between 1873 and 1876; the *Popular Encyclopædia*, 7 vols. (Glas., new ed. 1883); and Chambers's *Encyclopædia*, 10 vols. (Edin. 1860-68; new edition, 1889-93). Of these, the last-mentioned is a substantially new work, following in its construction the plan of the *Conversations-Lexicon*. A popular American Cyclopædia is *Johnson's Universal* in 8 vols. (1874-77, last ed., 1895).

The next encyclopædic work which appeared after the *Conversations-Lexicon*, was one projected according to an original philosophic plan by Samuel Taylor Coleridge, in 1818, and finished in 1845, in 30 volumes. This *Encyclopædia Metropolitana* was arranged in four divisions: 1st, the pure sciences; 2d, the mixed and applied sciences; 3d, biography and history; and 4th, miscellaneous and lexicographic articles. The contributions to the first two divisions were written by persons of recognized ability, and they have nearly all been published separately in 8vo volumes since the *Metropolitana* appeared. If the book had any fault, it was that the plan of it was too rigidly philosophical, and therefore not adapted to be consulted dictionary fashion; for although in one sense the alphabetic arrangement, by its jumble of subjects, is most heterogeneous and irrational, it recommends itself to popular acceptance by its extreme simplicity; and in point of fact, no E. has ever been thoroughly popular that has not been executed on the plan of a single alphabet, in which all subjects, however various, are included. Next appeared the *Penny Cyclopædia* of the society for the diffusion of useful knowledge, which was begun in 1833, and completed in 1843, in 28 volumes. This work was perhaps, at the time it appeared, the most useful and convenient, for the purposes of general consultation, of any encyclopædic treatise that had ever been issued. The *English Cyclopædia* is founded on the copyright of the *Penny Cyclopædia*, but is rearranged into four great divisions, which are each given in the order of the alphabet, viz., geography, natural history, biography, and arts and sciences. This publication was begun in 1853, and was completed in 1861, in 22 vols.; a synoptical index appeared in 1862, and a supplementary volume for each division has since (1869-73) been issued.

Among other publications of this character which have appeared in the course of the present century, may be mentioned Wilkes's *Encyclopædia Londonensis*, in 24 vols. 4to (Lond. 1810-29); the *Encyclopædia Perthenensis*, in 23 vols. (Edinburgh, 1816); and the *London Encyclopædia*, 22 vols. (Lond. 1829). The French have likewise published an *Encyclopédie des Gens du Monde*, in 22 vols. 8vo (Par. 1833-44); and *Encyclopédie Moderne*, which, with its supplement, occupies 43 vols. 8vo (Par. 1846-62); and a *Dictionnaire de la Conversation et de la Lecture*, 2d ed. in 16 vols. (Par. 1854-57), to which a supplement was afterwards added. The last of these is to a large extent based on the *Conversations-Lexicon* of Brockhaus. The most notable of the other German encyclopædias are Meyer's *Neues Conversations-Lexicon*, in 15 vols. (1857; 4th ed., 1890); and Pierer's *Universal Lexicon*, in 34 vols. (Altenburg, 1840-46), a sixth edition of which began to appear in 1875. In addition to these, there are several other continental encyclopædias, which are based upon the *Conversations-Lexicon*—such as the *Enciclopedia Española* (Madrid); the *Nuova Enciclopedia Popolare Italiana* (Turin); the *Nordisk Conversations-Lexicon*, 5 vols. (Copenhagen, 1858-63); and the *Seenskt Konversations-Lexikon*, 4 vols. (Stockholm, 1845-51); besides others in Russia, Hungary, the Netherlands, etc.

The *International Cyclopædia* appeared in 1885. Its purpose was to combine the best features of all previous works as tested by experience, and especially to serve the convenience of readers by subdividing topics, multiplying titles, and greatly facilitating its use by a very careful system of cross-references. It contains some 50,000 titles and many hundreds of illustrations.

3. We have now to speak of those books that are encyclopædias of some one special branch of knowledge. Such works have always been very numerous both in America and in Europe. Such are the *Biographie Universelle* (1811; 2d ed., 1865); Cuvier's *Dictionnaire des Sciences Naturelles*, 60 vols. (1845); McCulloch's *Commercial Dictionary* (2d ed., 1882); Bouvier's *Law Dictionary* (1885); McCulloch's *Geographical Dictionary* (2d ed., 1866); Lippincott's *Gazetteer* (1882); Morton's *Cyclopædia of Agriculture* (1855); Lalor's *Cyclopædia of Political Science*, 3 vols. (1885); Gwilt's *Encyclopædia of Architecture* (1888); Smith's *Dictionary of Greek and Roman Geography*, 2 vols. (1857); *Dictionary of the Bible*, 3 vols. (1863); *Dictionary of Greek and Roman Biography and Mythology*, 3 vols. (2d ed., 1851); *Dictionary of Greek and Roman Antiquities*, 2 vols. (3d. ed., 1891); McClintock and Strong, *Cyclopædia of Biblical, Ecclesiastical and Theological Literature* (1880); Allibone's *Dictionary of British and American Authors* (1871); Hackett and Laing, *Dictionary of Anonymous and Pseudonymous Literature* (1888); Chambers's *Cyclopædia of English Literature* (4th ed., 1885); Ure's *Dictionary of Arts, Manufactures and Mines* (7th ed., 1877); Peck, *A Dictionary of Classical Literature and Antiquities* (1895); Spon's *Dictionary of Engineering* (1874); Wood's *Reference Handbook of the Medical Sciences* (1889); Percy Smith's *Glossary of Terms and Phrases* (1883); Bartlett's *Dictionary of Americanisms* (2d ed., 1859); Bohn's *Dictionary of Classical Quotations* (1882); Hughes, *Dictionary of Islam* (1885); Fremy, *Encyclopédie Chimique* (1883); Sonnenschein's *Cyclopædia of Education* (1889); Bartlett's *Familiar Quotations* (8th ed., 1885); Houston's *Dictionary of Electrical Words, Terms, and Phrases* (1891); Stephen's *Dictionary of National Biography* (1891); Appleton's *Cyclopædia of American Biography* (1890); Sonnenschein's *Cyclopædia of Education* (1889); Scribner's *Cyclopædia of Music and Musicians* (1888); and Bliss's *Cyclopædia of Missions* (1891).

ENCYCLOPÉDISTES. See ENCYCLOPÆDIA.

END. This familiar word is concerned in some important discussions, and especially in ethics. It is in the sense of "the thing aimed at," the object, purpose, or goal of human action, that we have here to consider it. There is a fundamental contrast between science and art, knowledge and practice. Science, or knowledge, embraces the general order of the universe, and states that order in the form by which we can take in as much as possible in one view; it is the fullest intellectual comprehension of the phenomena of nature that the mind can attain to. Art, or practice, on the other hand, selects and appropriates certain items of knowledge, so as to subserve some useful purpose, some exigency of human life. Thus, agriculture, navigation, law, politics, education are all branches of practice; they involve knowledge, but in strict subordination to their several purposes. The navigator studies astronomy, not with a view to enlighten his understanding as to the mysteries of the solar system and the starry sphere, but with a view to the guidance of his course in the sea. In short, to an art (the word is not here used in the narrow sense of a fine art), or a department of practice, belongs in the first place the consideration of the *end*. Every art has its *E.*, which is its distinction from every other. In most of the arts, the *E.* is clear and unmistakable; we all know what is expected of a builder, a soldier, or a judge; the only question is how to obtain the knowledge requisite for adequately performing each separate function. But there are some departments where the *E.* itself is not agreed upon, which casts a peculiar difficulty on the practice. Thus, it was remarked under CIVILIZATION, that the *E.* of the whole mechanism of human society, including politics, etc., is differently viewed by different minds. But it is in the one special department of morality that the consideration of the *E.* is of most vital consequence. This feature of the ethical problem has been very little adverted to in modern discussions, while the ancient philosophers kept it more prominently before them. Aristotle

begins his *Ethics* by remarking that every art aims at some good; most arts, as medicine, ship-building, generalship, having limited or partial ends; while some comprehend much wider ends than others. The largest E. of all is the good of mankind collectively. Hence he goes on to inquire what is the highest good of man, and finds that happiness is neither pleasure, nor honor, nor virtue (by itself), nor wealth, but that it is "an energy of the soul according to virtue;" activity, in opposition to oriental notions of luxurious repose, being an essential in his eyes. He has next, therefore, to inquire what "virtue" is, according to which a man must employ his activity—a question of no easy solution. Still, the discussion brings out the one fact, that morality is a branch of practice, but unlike most arts in this, that the E. is peculiarly difficult to determine precisely. Accordingly, it is necessary to have in connection with it a set of discussions, called by Mr. J. S. Mill (*Logic*, concluding chapter) teleology, or the doctrine of ends, corresponding to what the German metaphysicians have termed the principles of practical reason. The various theories of moral obligation differ in their statement of the E. of morality; according to one, it is the self-interest of the individual; according to another, the interest of mankind on the whole. See *ETHICS*.

ENDEMIC (from *en*, among, and *demos*, the people), a term applied to diseases which affect numbers of persons simultaneously, but so as to show a connection with localities as well as with their inhabitants. Endemic diseases are usually spoken of as contrasted with epidemic (q.v.) and sporadic (q.v.); the first term indicating that a disease infests habitually the population within certain geographical limits, and also that it is incapable of being transferred or communicated beyond those limits; while, on the other hand, a disease is termed epidemic if it is transmitted without reference to locality; and sporadic if it occurs in isolated instances only. The theory, accordingly, of E. diseases is, that they are in some way or other connected with the soil—the result of terrestrial influences, or *miasms*—of poisons generated within the earth, or near its surface, and diffused through the air, so as to be weakened in proportion to the distance from the source of the poison. Such poisons are always observed to be more virulent in summer than in winter—more dangerous at night, when the vapors are concentrated on the surface of the soil, than in the day-time—more abundant in the plains, and in close confined places, than at a certain degree of elevation—more easily carried in the direction of the wind than in the opposite—and very often arrested altogether by water, or by a belt of forest or other luxuriant vegetation. In all these particulars, *endemic* are different from *epidemic* diseases, which bear no very obvious relation to the soil, and are not observed to be considerably modified either by the prevailing winds or the period of the day or night at which exposure to their influence takes place. The most marked type of an endemic disease is *ague* (q.v.) or intermittent fever, which has all the habits mentioned above, and is to so marked a degree a denizen of particular tracts of country as to lead to their being in some instances almost depopulated. Many places in Italy are a prey to the *aria cattiva* or *malaria*, as it is popularly called; and hence, no doubt, even more than for protection from human foes, the custom so prevalent in that country of building the villages on the tops of hills, so as to secure immunity from the poisonous vapors raised by the solar heat from the plains lying on either side at the base of the Apennines. Terrestrial *miasms*, or such poisons as generate E. diseases, are usually found in the neighborhood of marshy flats, or of uncultivated tracts of land at the confluence of rivers, or where a *delta*, or a wide channel subject to overflow, is formed at the upper end of a lake. In proportion, too, as the heat of the sun is greater, the tendency to malarious emanations is increased; and in the tropics, accordingly, large tracts of jungle and forest are often rendered absolutely uninhabitable and almost impassable at certain seasons, by the invisible and odorless germs of intermittent, remittent, and even continued fevers (q.v.), which are more fatal and unmanageable than the most terrible epidemic pestilence to those who are exposed to them. Such diseases are almost always sudden in their mode of attack, and they indicate the range of their influence by the number of persons attacked; but they are wholly free in most cases from the suspicion of communication by contagion (q.v.), which is so frequent in the case of epidemic diseases. The precise nature of the malarious poison has never yet been discovered with any approach to exactness. It is known, however, to be almost invariably checked by drainage and cultivation of the soil.

EN'DERBY LAND, discovered by Biscoe in 1831, lies in lat. 67° 30' s., long. 50° east. It appeared to the discoverer to be of considerable extent, and was closely bound by field ice, but owing to stress of weather and the extreme cold, it could not be approached within 20 or 30 m., and Biscoe was thus unable to say whether the land he discovered was an island or a strip of continental coast.

ENDERMIC AND HYPODERMIC METHODS OF TREATMENT. These terms are, as the names imply, used to designate certain methods of making the skin an agent for the reception of medicines. The endermic method consists in raising a blister by the ordinary process, opening it by a small puncture, which must not be at the lowest part of the bladder, gently pressing out the fluid contents, and then injecting a medicinal solution, by means of a small syringe, through the puncture into the emptied sac; or, if the medicine is in the form of powder, it may be scattered over the raw surface. The endermic method is now almost entirely superseded by the hypodermic method, in

which medicines are introduced into the subcutaneous cellular tissue by means of a very finely pointed syringe. For the invention of this process, the science of medicine is indebted to Dr. Alexander Wood of Edinburgh. It is chiefly, but not solely, to anodynes that these methods are especially applicable. It has been found that morphia given by Dr. Wood's method acts more speedily and more powerfully than when given by the mouth: moreover, the medicine given in this way does not disturb the functions of the stomach, and may be administered in those cases of irritation of that organ in which medicines introduced into it would be rejected by vomiting. A solution of acetate of morphia, carefully freed from any excess of the acid, and of such strength that three minims shall contain one third of a grain, is commonly employed, the dose varying from one to three minims, or from one ninth to one third of a grain of the salt. If the general effects of the morphia (as relief of pain and sleep) are required, any convenient part of the body, as, for instance, the fore-arm, may be selected: the skin, pinched up between the fore-finger and thumb of the left hand, is penetrated by the point of the syringe, and the solution injected. When a local action is required, as in the case of various forms of neuralgia, the solution should be injected as near as possible to the seat of pain. As some patients are remarkably susceptible to the action of morphia administered in this method, it is advisable to begin with the smallest of the above-named doses.

A scientific committee appointed by the Royal Medical and Chirurgical Society of London to investigate the physiological and therapeutical effects of the hypodermic method of injection, have sent in an elaborate report, which was read in June, 1867. Amongst the most important physiological facts which were observed, the following may be especially mentioned. Watery solutions of drugs subcutaneously injected were far less rapid in their action than when they were introduced into a vein. On comparing the effects of medicines subcutaneously injected with those produced when they were administered by the mouth, or by injection into the lower bowel, it was found that, in the case of some drugs, the local action was different according to the mode of administration, although the general effects produced were of the same kind. Thus, aconitine given by the mouth affected the salivary glands; when given by the rectum, it caused irritation of the gut; and when given by the skin, it occasioned local pain. The smallest dose fatal to rabbits was, by the mouth, $\frac{1}{100}$ th, by the rectum, $\frac{1}{100}$ th, and by the skin, $\frac{1}{100}$ th of a grain: it was thus five times as energetic when given subcutaneously as when given in the most usual way. The effects of morphia when injected under the skin were also more rapidly manifested and more intense than when given by the mouth or rectum. A solution of podophyllin, which, when administered by the mouth, acts as a powerful cholagogue (bile-provoking) aperient, when injected into the skin, gives rise to free action of the kidneys. The investigations of the therapeutic value of this mode of administering drugs were limited by the fact, that many substances (aconitine, for example) give rise to great local irritation when used subcutaneously. In cases of simple neuralgia, atropine was found to have a very beneficial effect when thus given, and in some cases more permanent relief followed its injection than that of morphia. The value of the latter drug was found to be much increased by this method, the required action being of longer duration, and being produced with greater rapidity and intensity. The same advantages followed this mode of giving quinine in intermittent fevers, but some caution is requisite in giving large doses, as irritation may arise from its presence under the skin. Amongst the conclusions at which the committee arrives are the following: (1) That, as a general rule, only clear neutral solutions of drugs should be employed, decidedly acid or alkaline solutions being apt to cause irritation, and even local ulcers, at the point of application; (2) that, as in the case of podophyllin, symptoms are observed to follow the administration of some drugs by the skin, which are wanting when the same drugs are otherwise administered; and (3) that the advantages to be derived from this method of introducing drugs are (*a*) rapidity of action, (*b*) intensity of effect, (*c*) economy of material, (*d*) certainty of action, (*e*) facility of introduction in certain cases, and (*f*) in some drugs, the avoidance of unpleasant symptoms.

ENDICOTT, JOHN, 1589-1665; b. England. He was sent out by the Massachusetts company in 1628, to oversee the plantation at Salem. He was deputy-governor of Massachusetts for five years, and governor in 1644-49, 1651-54, and 1655-56. He was a rigid puritan, zealous and intolerant in administration after the fashion of those times. While he was governor, four Quakers were executed for defying the law which banished them from the colony on penalty of death if they should return.

ENDICOTT, WILLIAM CROWNINSHIELD, b. Salem, Mass., 1827. He is said to be the oldest lineal descendant of John E., the first gov. of Mass. He graduated from Harvard univ., 1847; was admitted to the bar, 1850; was a member of the Salem common council; was city solicitor, 1858-63; and was called to the Supreme bench, 1873. Mr. E. has never held an elective public office. As the dem. nominee for gov., 1884, he was defeated by George D. Robinson. He was appointed sec. of war by Pres. Cleveland, 1885. He is one of the overseers of Harvard univ., and a member of the Mass. Historical Society. He was an old-line Whig until 1860.

ENDIVE, *Cichorium endivia*, an annual or biennial plant, of the same genus with chicory (q. v.), said to be a native of China and Japan, but which is naturalized in the

Levant, and has long been in cultivation as a garden vegetable, its blanched root-leaves being much used as a salad, and also sometimes for stewing and in soups.

ENDLESS SCREW, a screw combined with a cog-wheel, or one acting on the threads of a "female" screw sunk in the edge of a wheel. When the axis of the screw is at right angles to the plane of the wheel—that is, when the screw acts on a spur wheel—it is known as the American form.

ENDLICHER, STEPHEN LADISLAS, a distinguished botanist, was b. at Pressburg in Hungary, June 24, 1804. He was educated in his native town, Pesth, and Vienna, and then entered the church which he, however, abandoned in a few years. In 1827, he commenced his botanical and linguistic studies, and in the following year he was placed at the head of the imperial library at Vienna. In 1836, he was appointed keeper of the museum of natural history at Vienna, and in 1840, he became professor of botany in the university, and director of the botanic gardens. E. was much disturbed by the turn political events had taken in 1848, fell into a state of gloom, and in Mar. 28, 1849, put an end to his own life. A few of his works are upon ecclesiastical subjects, but the great bulk of his writings are botanical, the most important being connected with the systematic arrangement of plants. One of his earliest works was *Flora Posoniensis* (1830): in which he describes the plants growing in the neighborhood of Posen arranged according to the natural system. His most important work *Genera Plantarum secundum ordines naturales disposita*, appeared from 1836 to 1840. In it he follows out with great elaboration the system of natural arrangement. It has had great influence on succeeding botanists, and is still one of the most complete works upon systematic botany.

ENDOCARDITIS, disease of the internal surface of the heart, resulting in the deposit of fibrin upon the valves. See HEART, DISEASES OF.

ENDOCHROME (Gr. *endon*, and *chroma*, interior color), the coloring matter contained in the tissues of the lower classes of plants. It is a modification of chlorophyll, which gives the green color to the leaves of the higher classes of plants; when the chlorophyll changes its color in the autumn, in consequence, probably, of the retention of the oxygen element of carbonic acid, it is then not strictly chlorophyll, and may be called endochrome. Some chemists say that endochrome and chlorophyll have the same constitution, but it must be remembered that chlorophyll changes in accordance with the action of light.

ENDOGENOUS PLANTS, or ENDOGENS (Gr. *endon*, within, and *genos*, birth or origin), one of the great classes into which the vegetable kingdom is divided, the others receiving the corresponding designations of *exogenous plants* and *acrogenous plants*. The character from which this designation is derived is found in the structure of the stem, which does not increase in thickness by additional layers on the outside like the *exogenous* stem, familiarly illustrated in all the trees of the colder parts of the world, but receives its additions of woody matter in the interior; and in general does not continue to increase indefinitely in thickness like the exogenous stem, but is arrested when a certain thickness has been attained, different in different species, and afterwards increases only in length. When a transverse section is made of an endogenous stem, numerous bundles of vessels are seen dispersed irregularly in cellular tissues, the younger and softer parts of the stem exhibiting the cellular tissue in greatest proportion, the older and lower parts chiefly abounding in vascular bundles, which are, however, somewhat scattered in the central part of the stem, and are densely aggregated towards the circumference, there, in the palms generally, forming very hard wood, in some of them wood so hard that it cannot be cut with a hatchet. The stems of E. P. in the far greater number of cases produce terminal buds only, and not lateral buds, and are therefore unbranched. From the bases of the leaves, definite bundles of vascular tissue converge towards the center; but these extending downwards extend also outwards, and thus an interlacing of fibers takes place, which contributes not a little to the strength and compactness of the wood in the lower part of the stem. As the fibers extend downwards, they also become attenuated, spiral and porous vessels disappearing, and nothing but the most ligneous substance remaining. It is the hardening of the outer part of the stem which arrests its increase in thickness. Endogenous stems have not a distinct *pith* nor any *medullary rays*. When the central part is soft and pith-like, yet it is not distinctly separated from the surrounding wood, and has no *medullary sheath*. In many E. P., as in the greater number of grasses, the center of the stem is hollow. This is not the case at first, when the stem begins to grow; and when any cause makes the growth of the stem unusually slow, so that it is much stunted, it remains solid; the fistular character of the stem is the result of its rapid growth, rupturing the cells of the central portion, which finally disappear. Endogenous stems have no *cambium* and no proper *bark*. There is, indeed, a cellular *epidermis*; and there is also within it, and exterior to the hardest woody part of the stem, a comparatively soft layer of a corky substance, which is sometimes called bark, sometimes *false bark*, which does not separate from the wood below it without leaving myriads of little broken threads, the ends of the fibers which have extended into it from the hardest part of the stem. In those exogenous plants which produce lateral buds and branches, the fibers of the branches on descending to the stem extend on the outside of the proper stem, between its hardest portion

and the false bark; and in this way a great thickness is sometimes attained, as in the dragon-tree. In the grasses, a *plexus* of fibers takes place at the nodes, the fibers crossing from one side to the other. No British tree—and it may almost be said, no tree of temperate or colder climates—is endogenous. Almost all the endogenous trees are palms, although a few, as the dragon-tree, belong to other orders. E. P., however, are numerous in all parts of the world. Among E. P. are many of the plants most useful to mankind, particularly palms and grasses, all the true corn-plants being included among the latter. Nutritious substances are very extensively produced both in the fruit or seed, and in other parts; poisonous products are comparatively rare, although found in the *araceæ*, *liliaceæ*, *melanthaceæ*, and other orders. Aromatic secretions are characteristic chiefly of one order, *scitamineæ*. Besides palms and grasses, many of the E. P. are of great beauty, and many produce most beautiful flowers. Lilies and orchids may be mentioned as instances.

E. P. are *monocotyledonous*; and the terms *endogenous* and *monocotyledonous* are therefore often employed indiscriminately to designate the class. But Lindley distinguishes a class of *dictyogens* (q.v.), which, although monocotyledonous, have stems approaching to the exogenous character. The leaves of E. P. generally exhibit parallel venation, which is indeed strictly confined to them, although a venation resembling it, or rather simulating it, may be seen in some exogenous plants. The seed also germinates in a peculiar manner, different from that of exogenous plants, and to which the name *endorhizal* has been given, the radicle being protruded from within the substance of the embryo, and surrounded by a cellular sheath formed from the integument which it breaks in its egress.

ENDORSE. See PROMISSORY NOTE:

ENDORSE, in heraldry, an ordinary containing the fourth part of a pale. *Endorsed*, again, or *indorsed*, signifies that objects are placed on the shield back to back.

ENDOSMOSE AND EX OSMOSE (Gr. inward motion and outward motion), terms applied by Dutochet, the first investigator, to the transfusion that takes place when two liquids or two gases of different densities are separated by an animal or a vegetable membrane. As the transmission has no necessary relation to outwards or inwards, the term *osmose*, or *osmotic action*, is now preferred. See **DIFFUSION**.

This action performs a very important part in living organisms, and explains many phenomena of the circulation of sap and the processes of nutrition, which were previously referred only to the wonderful action of vital energy. Thus, the blood continually streaming through the capillary vessels gives forth a portion to the surrounding cells, and so supplies them with the necessary chyle. This may, however, by the expansion of the capillary vessels (see **INFLAMMATION**), lead to immoderate exudation. On the other hand, the blood, in passing by, takes up a number of worn-out constituents of the juices of these cells, and in this way serves, by the exchange which it effects, to restore the body, and to disburden it of products which have become useless.—In plants also, osmose performs an important part in the process of nutrition and the motion of the sap. The substances in the cells of plants are usually denser than the fluids without, and thus a process of endosmose takes place, by which the plant is supplied in the first instance from the soil, being incapable, however, of appropriating any nourishment which is not presented in a liquid state to the fibrils of its roots; whilst that which the roots give off by exosmose, is supposed gradually to unfit the soil for the growth of the same kind of plant. The bursting of the capsules of some kinds of plants is owing to a process of endosmose going on in the cells, as in the fruit of the elaterium or squirting cucumber. Some of the *entozoa*, as tape-worms, seem to live entirely by *endosmose*. See **OSMOSE**.

ENDOWED SCHOOLS ACTS. The restrictions placed upon the endowed schools of England, both those of royal and private foundation, in regard to terms of admission, course of study, etc., were found inconvenient and injurious to the schools, and the power of parliament was invoked to make certain needful changes; and during the present reign several statutes have been enacted for this purpose. The act 3 and 4 Vict. c. 77 empowered courts of equity to make decrees or orders extending the systems of instructions and the right of admission to any school, and to establish schemes for the application of its resources, having due regard to the intentions of the founder. The act 23 Vict. c. 11 required the trustees and governors of endowed schools to make such order as, without interfering with the religious teaching of the other scholars or authorizing any new religious teaching, should admit children of other denominations than that to which the foundation belongs, except where the foundation expressly requires the children to be instructed according to the formularies of such denomination. The most important public schools—Eton, Harrow, Westminster, etc.—were exempted from the operations of these acts. Another act annexed certain conditions to the appointment of officers in endowed schools. The act of 1869 is most important of all. It authorizes the appointment of commissioners, “with power in such manner as may render any educational endowment (with certain specified exceptions) most conducive to the education of boys and girls, and either of them, to alter and add to any existing, and to make new trusts, directions, and provisions which affect such endowment and the education promoted thereby.” A subsequent act continues and amends the act of 1869,

and one still later transfers the power of the endowed school commissioners to the charity commissioners.

ENDRÖD, a village of Hungary, in the county of Bekes-Csanaad, on the Körös, 90 m. e.s.e. from Budapest. Pop. 10,900. The surrounding district produces much corn.

ENDYMION, in Greek mythology, was a son either of Zeus or of Æthlios, and followed, according to some accounts, the occupation of a herdsman or hunter, but according to others, was king of Elis. On account of his uprightness, he is said to have received, at his own request, from Zeus, the gift of immortality, unfading youth, and everlasting sleep; but another version is, that Zeus having taken him up to Olympus, E. fell in love with Here (Juno), and was condemned by her enraged husband to eternal sleep on mount Latmos. Others, again, prettily fable that Selene (the moon), charmed by the beauty of the youth, conveyed him to Caria, and sent him to sleep on mount Latmos, that she might nightly kiss him unobserved. The Eleans, on the contrary, declared that he died among them, and in proof of it were wont to show his monument. The myth of E. has been happily interpreted by Max Müller in his article on comparative mythology, in the *Oxford Essays* (1856). E., according to him, is one of the many names of the sun, but with special reference to the setting or dying sun, being formed from *enduo*, probably a dialectic variety of *duo*, the technical verb in Greek to express sunset. E. sleeps in the cave of Latmos, i.e., of night (from the same root as *leto* or *latona*, the night). So far the myth poetically describes certain phenomena of nature, the sinking of the sun in the west, and the rising of the moon, that seems to follow his departing beams. But the original signification of the metaphors becoming lost, as might naturally happen when the words expressing them had only a local usage, it was, we may say, inevitable that people should transfer the metaphors to persons, and invent a history to supply the place of the vanished poetry. And this invention, or more properly, explanation (for it was doubtless made in all good faith), is what properly constitutes the myth of Endymion. The story has been made the subject of a poem by Keats.

ENE MA (Gr. *en*, in, and *ēmi*, I enter), a medicine or fluid substance conveyed into the body by friction, usually through the rectum or lower bowel. See **CLYSTER**.

ENEMY, in international law signifies either a nation at war with another, considered as a whole, or an individual or body of men belonging to the hostile nation. By ancient practice to constitute a lawful enemy there should be a public declaration of war made to the nation against which hostilities are intended. Such a declaration was considered to be demanded by the ordinary laws of humanity and fair dealing. In modern times it is held that all that is requisite is a public proclamation of war made by a nation within its own territory; this answers all the demands of formality, apprises neutral peoples of the impending war, and is so public in its character (under modern conditions) that the enemy must be presumed to have taken notice of the declaration.

Under monarchical governments the right of declaring war against a public enemy is universally reserved to the crown; in the United States the constitution gives to Congress the power "to declare war, grant letters of marque and reprisal, and make rules concerning captures on land and water;" thus making it the duty of that body to define who are the public enemies, and to prescribe the rules for their treatment. It has been a mooted question whether a nation at war should treat all the subjects of a hostile country as enemies individually, or only the nation itself, regarded in its corporate capacity and as represented by its authorized forces—its army and navy. The tendency has been in recent times strongly towards the latter theory; private individuals not commissioned to bear arms and not taken in the act of hostility are now by civilized nations treated with all possible humanity and forbearance. It was a corollary of the old theory that all individuals of a hostile state were enemies, that the property of aliens residing in a country with which their own was at war might be confiscated, and even that they might be made prisoners. It is to be doubted if such action would to-day be taken by any civilized nation, unless, possibly, in the way of reprisal. In regard to the treatment of enemies there has been a great advance in the humanity and forbearance of the rules governing the carrying on of hostilities. In the civil war in the United States a code of rules was adopted which was drawn up by the well-known publicist, Professor Lieber, and this code has served as a basis for rules subsequently adopted by international conference in Brussels (1874) and Oxford (1880). By all these codes what is allowable in war is, speaking generally: the destruction or injury of enemies in arms by ordinary methods of warfare; the destruction of property when necessary to carry on operations of war, or to reduce the military strength of the enemy; such incidental injury to persons or property of non-combatants as the operations of war make unavoidable. Killing or wounding, except in battle, or regular military operations, the use of poison, the use of cruel or unusual weapons, wanton destruction of property—all are strictly forbidden.

ENERGICO, an Italian term in music, meaning with energy and force; with strong articulation and accentuation, and a marked powerful delivery of the single notes, without losing in distinctness of execution.

ENERGUMENS, a class of persons, who in the early ages of the church were believed to be possessed by evil spirits, and were placed under the special care of exorcists, yet allowed a certain amount of participation in religious services. Catechumens included

in this class could not be baptized, except in cases of sickness; while the faithful who became deranged were obliged to remain apart from their fellow Christians, in the area of the church, which was not enclosed, deriving from this circumstance the name of *χειμαζόμενοι*—exposed to the weather. They could not partake of the Lord's Supper, except upon their death-beds.

ENERGY. See **FORCE**, **THERMO-DYNAMICS**.

ENFANT GÂTÉ (Fr., "spoiled child") is a term used in polite society in France to denote a person who has been reared in luxury, and is devoted to a life of inactivity and ease.

ENFANTIN, **BARTHÉLEMY PROSPER**, the chief representative of St. Simonism, and as such, usually styled père Enfantin, was the son of a banker at Paris, where he was born Feb. 8th, 1796. He became a pupil in the *Ecole Polytechnique* in 1812, but was expelled in 1814, in consequence of his having joined the pupils who left school and fought against the allies on the heights of Montmartre and St. Chaumont. He was afterwards a commercial traveler in Russia, then a banker's clerk, and in 1825, became director of the *Caisse Hypothécaire*. About this time, he became a disciple of St. Simon, whose ideas he developed, after the death of their author, in the *Producteur*. After the July revolution, E. associated himself with M. Bazard for the active propagation of St. Simonism. Bazard preached it in its relations to philosophy and politics; E. mainly in its relations to the social state. Soon, however, a schism broke out between the two on the question of marriage and the relation of the sexes. Recognizing the "mobility" of the affections, E. affirmed that they ought to be "free," and of course pronounced against the ties of marriage. E.'s views were pushed so far, that government deemed it necessary to interfere on the grounds of public decency. The "supreme father" (as his disciples were wont rather profanely to call him) was, after a trial of two days, sentenced to two years' imprisonment, and to pay a fine of 100 francs. Being released at the expiration of a few months, E. went to Egypt, and, after an absence of two years, returned to France, and became a postmaster and farmer in the vicinity of Lyons. In 1841, he came to Paris, and was appointed a member of the scientific commission for Algiers, and on his return from Africa, wrote a sensible, interesting book, entitled *Colonisation de l'Algérie* (Paris, 1843). After the revolution of 1848, he edited the journal entitled *Le Crédit Public*, a paper retaining much of the old St. Simonian character, but which had to stop in 1850 for want of funds. E. afterwards held an important situation on the Lyons and Mediterranean railway. His principal works are his *Doctrine de St. Simon*, in conjunction with others (1830); his *Traité d'Economie Politique; La Religion Saint-Simonienne* (1831); *Moral; Le Livre Nouveau* (1832); *Correspondance Philosophique et Religieuse* (1847); *Correspondance Politique* (1849); *La Vie Eternelle, Passé, Présent, Futur* (1861). He died Aug. 31, 1864.

ENFANTS PERDUS. (Fr., "lost children.") English equivalent, "A Forlorn Hope" (q.v.). The term is a military expression meaning formerly the officers and men who were appointed, or who volunteered, to lead the way in some especially dangerous assault; a work now performed by those next in order on duty.

ENFANT TERRIBLE (Fr.), literally, *terrible child*, one given to making inconvenient remarks, more or less clever, and mostly personal, to the confusion of present company.

ENFEOFFMENT. See **FEOFFMENT**.

ENFIELD, a town in Hartford co., Conn., on the Connecticut river, and the New York, New Haven and Hartford railroad, 18 m. n. of Hartford; contains two villages. There are carpet factories, bicycle works, steam brick works, and extensive powder-mills, the latter said to be the largest in the world; several churches, banks, public library, sanitarium, electric lights and street railroad, and a high school. In the town is Shaker station, a community of Shakers. Pop. town, '90, 7199.

ENFIELD, a t. in Middlesex, England, 10 m. n.e. of London, noted as the place of manufacture of the Enfield rifle, now the Martini-Henry rifle; pop. '91, 31,532. In the place are the remains of a royal palace in which Edward VI. kept his court.

ENFIELD, a tp. in Halifax co., N. Car.; traversed by the Wilmington and Weldon railroad, and containing the town of Enfield. Pop. '90, tp. 3650, town, 568.

ENFIELD, WILLIAM, LL.D., an English author and dissenting minister, was born in Sudbury in 1741, and died at Norwich in 1797. He was educated at Daventry under Dr. Ashworth, and on leaving the seminary officiated in a Unitarian church at Liverpool, then removed to Warrington, where he was resident tutor and lecturer on belles-lettres in the academy at that place. In 1785 he became pastor of the Unitarian church at Norwich. He aided Dr. Aikin in preparing his *General Biographical Dictionary*, and published *A History of Philosophy*, an abridgment of Brucker's work (1819); *The Preachers' Directory*, a work that became very popular (1771); *Sermons for Families* (1778); and *The English Preacher* (9 vols.). A memoir was written by Dr. Aikin.

ENFIELD RIFLE-MUSKET, so called, deriving its name from the place of its manufacture in England, was a kind of small-arms resembling the old Springfield rifle-musket.

ENFILADE is a military term applied to a fire of musketry or artillery made in the direction of the length of a line of troops or a line of rampart. A besieging battery so placed as to send its shot along any part of the line of a fortification, and inside the parapet, does great execution in dismounting the guns, which thus present the largest surface to the balls. Hence the lines of rampart should be planned that their prolongations may fall in situations inaccessible to the enemy. Where this is not possible, the lines are either broken, or are protected by bonnets (q.v.), or by traverses (q.v.), or blindages (q.v.). In the siege of a fortress, the trenches of approach are cut in a zigzag, to prevent the defenders enfilading them from the walls.

ENFRANCHISE, ENFRANCHISEMENT, to make free; the admission to certain liberties or privileges. Thus, a person made a denizen of the country, or receiving the freedom of a city or burgh, is said to be enfranchised.

ENGADINE, a famous valley in Switzerland, in the canton of Grisons, second only to the Valais in length, extends n.e. for about 50 m. along the banks of the Inn, from the foot of Mt. Maloja to the village of Martinsbruck. It is divided into two portions—that toward the s.w., called the Upper E., and that toward the n.e., the Lower Engadine. The latter is wild and bleak, pent up within narrow limits among the hills, and having a huge barrier of glaciers between it and Italy. The upper E. has a remarkably invigorating climate and is a resort for consumptives. It contains the village of St. Moritz. The Inn, which enters the valley at its s.w. or upper extremity, and flows through it, has many towns upon its banks, the highest of which, Silvaplana, is about 6,000 ft. above sea-level.

ENGAGEMENT, MILITARY. See **BATTLE**. It is of interest to note how, since 1880, the scientific theories of the conduct of a battle are rapidly being modified by the recent inventions of more effective instruments of destruction. Most important among these discoveries are: (1), the great increase in the range of artillery; (2), the invention of rapid-fire and machine-guns; (3), the perfection of the magazine-rifle; (4), the discovery of new explosives of tremendous power, such as dynamite, melinite, écrasite, emmensite, and roburite; and, (5), the invention of smokeless powder.

No great conflict has arisen since the adoption of these new appliances for war, to test them by the practical experience of the battle-field; but already the theory of military engagements has been seriously modified by modern tacticians. A recent writer has made some interesting remarks upon this head.

"As might be expected, the fundamental principles of war are the same, but a thousand circumstances have modified the phenomena which they display. For example, in one of the essential conditions of victory: when Napoleon said that fortune always favored big battalions, he was merely stating the truism that the surest way of beating a hundred men is to attack them with two hundred. Hence the strategist is always endeavoring to get the greater military force at a particular place and at a particular moment. From these premises arose Napoleon's favorite manœuvre—a manœuvre similar to that of 'breaking the line' at sea. Napoleon liked to drive his army like a wedge into the middle of his opponents. This done, he hit out left and right, and drove back the disunited enemy on separate lines of retreat. Then came in the application of the rule that the greater beats the less. He singled out one or other half of the divided army of the enemy for attack, and crushed it with his whole strength. To do this, he swiftly brought over, say, the left wing of his army, joined it to the right, and then threw his united force on one-half of the army opposed to him. As a rule, numbers prevailed; he crushed his foe, and then hurled himself on the other and still unconquered half. Now, it might be supposed that this operation must remain as practicable now as it was a hundred years ago. Oddly enough, however, it is no longer sound generalship. And for this reason, a modern army, partly from its size, possesses much greater possibilities of delay and of fighting a waiting battle, than did those of two generations ago. A weaker force, that is, can more easily hold in play a stronger. Hence, when A's force has united and tries to crush one-half of B, that half is able to hold A in check till the other half comes up and unites with it.

"If it were possible for an army of our day, supplied with all the implements with which modern science has provided it, to meet an army of equal numbers equipped as Napoleon's armies were equipped, the difference in power of the modern army would be such that it would almost be able to deal with its enemy as civilized armies provided with fire-arms were at first able to deal with savages possessed only of bows and arrows. The artillery of the days of Napoleon would not be able to act at all, for our modern infantry can fire with effect at a distance greater than could Napoleon's big guns. Our artillery would be able to destroy Napoleon's army before either his artillery or infantry could act against us. Thus, an army of 50,000 men of our own time must be reckoned as possessing at least the resisting power of 100,000 of the days of Napoleon. It is obvious, therefore, that the relationship between time, distance, and the resisting power of armies has been greatly affected by the change in the character of the weapons; and that calculations as to what a superior army can do in a given time to break up the force of an army opposing it, and to be free to deal with another army, are greatly modified." See Maurice, *Modern War* (1891). See also **ARTILLERY**; **ARTILLERY CORPS**; **ARTILLERY, PARK OF**; **BREECH-LOADING ARMS**; **CAVALRY**; **DYNAMITE GUN**; **EXPLOSIVES**; **EXPLOSIVES OF HIGH POWER**; **FORTIFICATION**; **GUN COTTON**; **GUNPOWDER**; **INFANTRY**; **MACHINE GUNS**; **MAGAZINE RIFLES**; **MELINITE**; **RAPID-FIRE GUNS**; **SMOKELESS POWDER**; **STRATEGY**; **TACTICS, MILITARY**.

ENG AND CHANG. See SIAMESE TWINS.

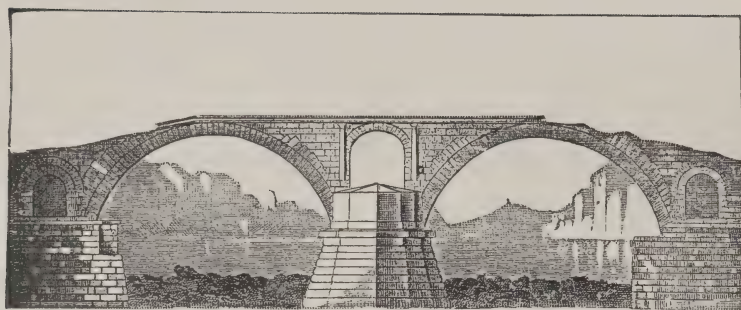
EN-GEDI (meaning in Hebrew "the fountain of the kid," and corresponding to the Arabic "Ain Jidy") is the name of a wilderness, a mountain pass, a ruined village, and a perennial fountain on the w. side of the Dead sea, half way between its northern and southern ends. In the days of Abraham it was the site of a city named Hazezonta-mar, *cutting of palm trees*, doubtless with reference to the grove of trees which then grew around the fountain. In its strongholds was the home of the Amorites, who were, at that time, attacked and destroyed by the Assyrians and their allies. Here in "the city of palm-trees," at the time of the exodus from Egypt, a branch of the Kenites lived concerning whom Balaam said—"Strong is thy dwelling place, and thou puttest thy nest in the rock." After the conquest of Canaan they left this fortress and went up to dwell with the tribe of Judah. Four hundred years later, David fled for refuge into the strongholds of En-gedi. When Saul heard this he "took 3,000 chosen men and went to seek David and his men on the rocks of the wild goats." Entering one of the numerous caverns, it proved to be the very one in the sides of which the fugitives were concealed. David, refusing to lift his hand against the king, and forbidding his followers to touch him, cut off the skirt of his robe, as proof of what he might have done, and let him depart. After David, Solomon celebrated in his "song of songs" the vineyards of En-gedi, which, as the ruins still show, were planted all along the terraced side of the mountain. About 1000 years later the Jewish sect of the Essenes, in their progressive efforts to isolate themselves from all the impurities of life, chose at last as their retreat the absolute solitude of the caverns around the fountain of En-gedi. Four hundred years afterwards there was a large village on the coast below the fountain, the ruins of which yet remain.

ENGEL, CARL, author, b. in Thiedenweise, near Hanover, July 6, 1818; d. in London, Nov. 17, 1882. He studied the pianoforte under Hummel, and settled in London about 1844. He owned a large collection of rare musical instruments, many of which were given after his death to the South Kensington Museum, with which he had been connected for many years. His important books are: *The Music of the Most Ancient Nations* (London, 1864); and *An Introduction to the Study of National Music* (1866).

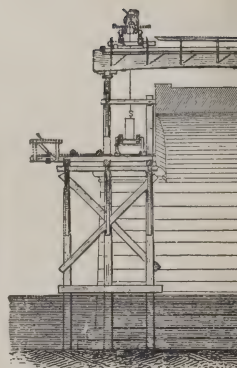
ENGEL, ERNST, statistician, b. in Dresden in 1821, studied at Freiberg, and afterwards at Paris. Subsequently called to the direction of the statistical bureau in Dresden, he superintended the publication of a number of important statistical works, and after the death of Dieterici, he became the head of the Prussian statistical bureau. His works are both numerous and valuable, including, among others, a comparison of German industries in 1861 and 1875, a work entitled *The Age of Steam*, and a treatise on the price of labor. His researches made clear the important law that, as the wages of workmen increased, a smaller proportional share of their income was expended upon the necessities of life, and a more than proportional share was applied to the gratification of the desire for luxury, social ambitions, and the like.

ENGELHARDT, JOH. GEORG VEIT, a learned German theologian, was b. 12th Nov., 1791, at Neustadt on the Aisch, and studied at Erlangen, where, in 1820, he was appointed extraordinary professor, and in 1823 ordinary professor of theology. He died 13th Sept., 1855. Patristic and mediæval dogmatics, and Neoplatonism, are the subjects which he has chiefly investigated. In 1820, he published at Erlangen a translation of the first *Ennead* of Plotinus; in 1823 appeared his translation of the writings ascribed to Dionysius the Areopagite. His *Kirchengeschichtlichen Abhandlungen* (Erl. 1832), *Auslegung des speculativen Theils des Evangeliums Johannis durch einen deutschen mystischen Theologen* (Erl. 1839), and his contribution to the history of the mystical theology, entitled *Richard von St. Victor und Johannes Ruysbroek* (Erl. 1838), are works of great value, and have thrown a new light on many important points. Very useful, too, especially on account of the richness of their special notices, are his *Handbuch der Kirchengeschichte* (Erl. 1834), and *Dogmengeschichte* (Neustadt, 1839). E., in the course of his life, wrote many learned dissertations in the *Journal of Historical Theology*, among which may be specified his *Ueber die Hesychiasten*, and *Ueber Erasmus Sacerius*.

ENGHIEN, LOUIS ANTOINE HENRI DE BOURBON, Duc d', only son of prince Henri Louis Joseph, Duc de Bourbon, was b. at Chantilly, 2d Aug., 1772. In 1789, he quitted France, and traveled through several countries of Europe. In 1792, he entered the corps of *émigrés* assembled by his grandfather, the prince of Condé, on the Rhine, and commanded the vanguard from 1796 until 1799. At the peace of Lunéville, in the year 1801, he went to reside at Ettenheim, an old château on the German side of the Rhine, not far from Strasburg, and within the territories of the duke of Baden. Here he married the princess Charlotte of Rohan Rochefort, and lived as a private citizen. When the conspiracy of the Bourbon princes, headed by Cadoudal, Pichegru, etc., against the life and authority of Bonaparte, was discovered at Paris, the latter chose to believe that the duc d'E. was privy to it, although there was not a tittle of evidence to prove this. Perhaps Bonaparte was afraid that the valor and humanity of the last descendant of the great Condé might one day prove dangerous to his power. Be that as it may, he unscrupulously resolved to seize the person of the duke. On the night of the 17th Mar., 1804, the neutral territory of Baden was violated, and the château of Ettenheim surrounded with a body of soldiers and gendarmes. The duke, at first, endeavored to defend himself; but the force was too great to be opposed, and he, with several friends and domestics, was captured, and carried prisoner to Strasburg, and immediately after to Vincennes. On the 20th of Mar., he was tried before a court-martial, consisting of



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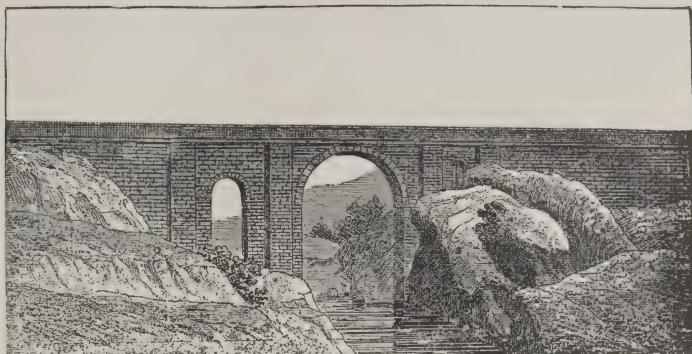
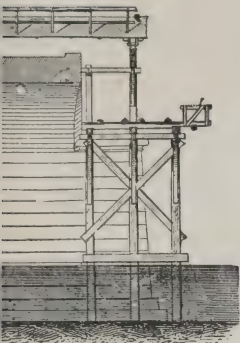


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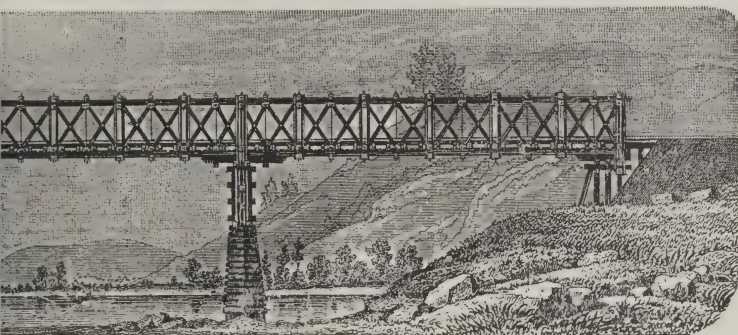


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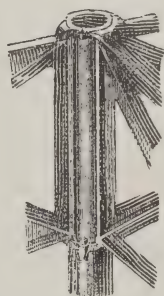
ENGINEERING.—1. Fabricius bridge, Rome. 2. Etrurian aqueduct. 3. Railway trestle bridge. 4. Opening a dam. 5. Opening a railway cut.



2



3



6



8

4. Bridge scaffolding. 5, 6. From the Crystal Palace in Sydenham. 7. Constructing

eight officers, and after an examination of five hours, was condemned to death. Half an hour later, the sentence was put into execution. So cruel and audaciously criminal an act has fixed a deep stigma on the character of Bonaparte. M. Dupin has published the records of the trial, and shown the illegality of the proceedings of the military commission. This illegality was publicly acknowledged by Gen. Hullin, the president of the court. After the restoration, the bones of the judicially murdered duke were taken up, and interred in the chapel of the castle at Vincennes.

ENGINEER AND ENGINEERING. Engineering, the business of the engineer, is the art of designing and superintending the execution of works of a constructive character, such as roads, railways, bridges, canals, harbors, docks, works for supplying water to towns, drainage and sewerage works, mining machinery, and the working of metals.

Engineering may be divided into several branches: mechanical, electrical, mining, civil and military. The two broadest branches are mechanical and civil engineering, and all of the other branches of engineering may be considered as special departments of one or the other of these two branches. The branches of engineering are constantly becoming more specialized. The military engineer is an officer in the service of government, whose duties are principally to construct fortifications, to make surveys for warlike purposes, to facilitate the passage of an army by the construction of roads and bridges; in short, to execute all engineering works of a military nature.

The civil engineering profession is subdivided into several sections, according to the special nature of the employment of its members. The railway engineer projects and superintends the execution of railways and all the works in connection with them, such as the alteration of roads and streams, the construction of viaducts, bridges, cuttings, and embankments. The hydraulic engineer constructs the works connected with the supply of water to towns, the filtering of water, its collection in reservoirs, and its distribution through a town or district; the irrigation and drainage of tracts of country; the protection of low lands from inundation, and the use of water as a motive-power. The dock and harbor engineer has the management of all works connected with the sea or navigable waters, such as the construction of piers, breakwaters, docks, harbors, and light-houses. The mechanical engineer is principally concerned in the manufacture of machinery, the working of metals, the construction of ships, steamers, cannon, and all the various structures in which the metals bear a prominent part. Then there is the mining engineer, who discovers minerals and manages mines; there are engineers who are specially engaged in the drainage of towns, and electrical engineers who are engaged in the designing and construction of plants for electric lighting, electric railways and electric power transmission.

In all engineering works, the *contractor* takes a very important part; he executes the works from the designs and under the direction and superintendence of the engineer, and on his good management the success of undertakings largely depends.

The engineering works of antiquity are both numerous and prominent, many of them remaining while all other traces of their constructors have been swept away. The most notable of the works belonging to very remote antiquity are the harbors of the Phenicians, the palaces and sewerage of Nimroud, and the pyramids of Egypt; next in order come the harbors of ancient Greece, the bridge of boats across the Dardanelles, made by Xerxes, to transport his immense army into Europe, and his canal across the isthmus of the peninsula of mount Athos. The buildings of ancient Rome next claim attention—its theaters, temples, baths, and aqueducts, some of which carried water from distances of more than 50 m. into Rome; its roads, bridges, and drainage-works vie in extent and magnificence with the most celebrated works of modern times.

From that period down to the commencement of the 18th c., the most extensive works executed are the canals, embankments, and other hydraulic constructions used by the Dutch for the purposes of inland navigation, and to protect their low lands from the sea; the canals of North Italy, the cathedrals and fortifications of mediæval Europe.

Civil engineering, as a distinct *profession*, may be said to have originated, in England, about the middle of the last century; since that time, the improvements in the steam-engine by James Watt, its subsequent application to the railway system by George Stephenson, and its use in navigation, have given a great impulse to commerce and civilization; which, in their turn, have created the necessity for the numerous and magnificent engineering works of modern times; such as the innumerable railways, roads, and canals that intersect this and foreign countries; the bridges, water-works, docks, harbors, and vessels that facilitate our commerce and increase our comfort and prosperity. Among the most remarkable of these works may be mentioned the tubular bridges of the St. Lawrence and Menai strait, the Niagara railway suspension bridge, and the electric telegraph system.

The education of those who would rise to eminence in the profession, must embrace a fair knowledge of pure mathematics and of the mixed sciences of natural philosophy, such as mechanics, hydrostatics, hydraulics, and optics. They should acquire a knowledge of the principles of projections, and should aim at being good draughtsmen and rapid and accurate arithmeticians.

In conclusion, it may be said that every day opens fresh fields to engineering science and labor; and that as the first beginnings of the art are lost in the obscurity of remote antiquity, so we see no termination to its usefulness and necessity.

The more important operations involved in engineering are treated of under such heads as AQUEDUCT; BRIDGE; CANAL; DYKE; EMBANKMENT; RAILWAYS; ROADS; SUSPENSION BRIDGES; TUBULAR BRIDGE; WATER-SUPPLY.

ENGINEERS, CORPS OF, organized in the United States in 1802, to consist of 1 col., 1 lieutenant-col., 2 majors, 4 captains, 4 first and second lieutenants and cadets, the whole number not to exceed 20, to be stationed at West Point and to constitute a military academy. In 1838 the corps was increased to 47 officers; and a corps of topographical engineers in addition, was organized. In 1846, sappers, miners, and pontoniers (bridge builders) were added. In 1861, at the beginning of the civil war, three additional companies were provided for, and one of topographical engineers was added. This company was disbanded in 1863, and its officers sent to the corps of engineers. In 1866 the battalion of engineers was organized from the companies already authorized, the station being at Willets Point, New York. The officers of the battalion, which comprises 500 enlisted men, are 1 lieutenant-col., 4 captains, 3 1st lieuts., and 7 2d lieuts. There are 34 sergeants, 34 corporals, 8 musicians, 210 privates 1st class, and 212 privates 2d class. The officers of the corps comprise 1 brig.-gen'l, 6 cols., 12 lieutenant-cols., 24 majors, 30 captains, 26 1st lieuts. and 10 2d lieuts. Their duties embrace reconnoitering and surveying for military purposes; the selection of sites and formation of plans and estimates for military defenses; the construction and repair of fortifications and their accessories of every description; the planning and superintending of defensive or offensive works of troops in the field; the examination of routes of communications for supplies and for military movements, and the construction of military roads and bridges; also the execution of river and harbor improvements, and such other duties as the President may order.

Until 1866 an engineer officer was always appointed as superintendent of the Military Academy at West Point, but since that year all branches of the service are admitted to their share of supervision. The first appointment of an engineer in the United States Navy was in 1836, a year before any similar appointment was made in the English navy, but the corps was not organized and incorporated in the navy register until 1843. The Secretary of the Navy wrote Captain M. C. Perry, in November, 1837, that the *Fulton* was allowed, as recommended by the Commissioners of the Navy, and approved by the navy department, 2 1st class engineers at \$800 per year each, 2 2d class engineers at \$500 per year each, 8 firemen at \$25 to \$30 per month, and 4 coal-heavers at \$15 per month. This was the germ of the engineer corps of the navy, which, by law of August 5, 1882, is to consist of 10 chief engineers, having the relative rank of captain in the navy, 15 with the relative rank of commander, and 45 with the relative rank of lieutenant-commander; 60 passed-assistant engineers, with the relative rank of lieutenant and lieutenant, junior grade; and 40 assistant-engineers of the relative rank of ensign. The present regulation for the appointment to the engineer corps requires that the class about entering upon the fourth year's course at the naval academy shall be divided into two portions, based upon the number of vacancies that have occurred the previous fiscal year in the line and marine corps combined and the engineer corps. Upon graduation the cadets are appointed to the grade of assistant engineer in a number corresponding to the total number of vacancies in that grade for the previous fiscal year, but whether vacancies exist or not at least two shall be appointed each year.

On board flagships, the chief engineer of the vessel is usually one of the general staff of the commander-in-chief, and in this position he exercises a general supervision over all the engineers of the fleet or squadron, makes quarterly inspections of machinery, and decides upon all ordinary repairs. Previous to the departure of any of the vessels on detached service he sees that they are provided with all that may be required in the engineer's department. He examines into the coal used by the squadron, reports upon its quality, and sees that it is properly stored at the depots, and that there is always a sufficient amount on hand for the probable use of the various vessels. The chief engineer has charge of the boilers and machinery, coal-bunkers and store-rooms, and keeps an account of the expenditure of coal and all other stores in his department. The assistants in the engineer's department carry into execution all orders received, and have care of the various portions of machinery, the boilers and their dependencies. They stand the watches in the engine-room when the vessel is under way under steam, and are responsible for the working of the machinery. The cadet engineers act as assistants, may be assigned to duty in charge of the engine-room and perform such other duties as may be assigned them by the chief engineer. The pay of a fleet engineer is \$4400 per year; the sea-pay of a chief engineer is \$2800 for the first five years after date of commission, \$3200 for the second five years, \$3500 for the third five years, \$3700 for the fourth five years, \$4200 after twenty years from the date of commission. The passed-assistants receive \$2000 for the first five years, \$2200 for the second five years, \$2450 for the third five years, and \$2700 for the fourth five years. The assistants receive \$1700 for the first five years, and \$1900 for the second five years. The cadet engineer receives \$950 per year.

ENGINEERS, IN THE UNITED STATES NAVY, are commissioned officers having charge of the machinery of steam vessels. They must have a thorough practical education in the construction and management of steam machinery. In military law, they are considered non-combatants.

ENGINEERS, THE ROYAL CORPS OF, forms one component portion of the army of the British empire. A similar corps exists in all regular armies. It is the scientific and constructive branch, intrusted with the making and defending of all military *works*, and the attack and conquest of similar works belonging to an enemy. It is true that civilians are often employed to construct the buildings themselves, at a stated price; but the military engineers make the plans, and are responsible to the country for their efficiency. At the present time, for instance, and for a number of years past, contractors are at work on fortifications at Portsmouth and in other parts of the kingdom, but on plans and under orders for which the engineer department of the government is responsible.

The royal engineers of the United Kingdom form one regiment or corps. The officers, in time of peace, are scattered all over the world. There is no half-pay, except on *permanent* retirement; and no unemployed list. They have much wear and tear of body and mind, and are considered entitled to a competent retiring allowance at an earlier age than other officers. Their regular pay corresponds to the active pay of other officers of the same rank; but they exclusively receive in addition *extra* pay, amounting to one-half their ordinary pay when on duty at home, and equaling their ordinary pay when employed abroad or in the London district. There is an establishment of engineers in each military command, to conduct and superintend all the military buildings and works. The entire force is under a particular department of the war-office, that of the inspector-gen. of fortifications. Until the year 1763, the duties of military engineers were discharged by officers taken from the regular army. In that year, however, the corps of engineers was formed, greatly to the advantage of the military service. In 1783, it was made a *royal* corps, and a distinctive uniform adopted.

ENGINEERS, IN THE ENGLISH NAVY, are the persons who attend to the machinery on board war-steamers. When such steamers were first adopted, men were obtained from private engineering establishments, or from merchant-steamers. In 1847 and 1848, many changes were made, to induce skillful and steady men to enter the service, and to maintain better discipline. The higher grades of them were raised from the rank of *warrant* officers to that of *commissioned* officers of a civil branch. There are now the grades of chief inspector of machinery afloat, inspector of machinery afloat, chief-engineer, engineer, and assistant-engineer, the last rank being subdivided into two classes. All these are commissioned officers, and are strictly examined before admission; their rank and promotion being by selection, and dependent on skill, character, and length of service. A chief-engineer is expected to be able to make notes in the log of every particular concerning the engines and boilers; to draw rough sketches of the machinery, with figured dimensions fit to work from; to understand and manage everything relating to engines, boilers, and furnaces; to understand practical mechanism generally, and the principles of the theoretical mechanism. The engineer and assistant-engineer are expected to possess, in a smaller degree, the same kinds of knowledge and skill. The pay varies from £511 for a chief inspector of machinery, down to £64 for a second-class assistant-engineer on harbor service.

ENGLAND, the southern and larger section of the island of Great Britain, and the most important member of the United Kingdom of Great Britain and Ireland. The geography of E. will be found under the head of GREAT BRITAIN, the present article being confined to a sketch of its history previous to the union with Scotland.

Of the inhabitants of E. before the Christian era, little is known. In some of the ancient geographers, there are a few scattered notices of a rude population, with whom a limited commerce in tin was carried on by the Phœnician merchants; and our information scarcely extends further. What is known of E. under the Roman occupation has already been embodied in the article BRITANNIA. An account of the country during the period intervening between the withdrawal of the Romans and the Norman conquest will be found in the article ANGLO-SAXONS.

When William of Normandy landed in E. to claim the crown which Edward the Confessor had bequeathed to him, he found that the people had raised to the throne Harold, the son of a popular nobleman. The resources of the Saxons, however, had been wasted in domestic conflicts before the attack of William; and the battle of Hastings (1066 A.D.) gave E. with comparative ease to the Normans. The next 20 years saw the conquest completed, and nearly all the large landed estates of the Saxons pass, on every pretext except the true one, into the hands of the Normans. William claimed, indeed, to rule as sovereign by hereditary right, but this made little difference to the fact of conquest. All the high offices in the state and in the church passed into the hands of a new race. The Danes alone could retain either property or dignity. For long, some of the Saxons maintained an unequal resistance, retiring to the forests as the outlaws whose adventures furnished the materials for those favorite popular legends, where, as in Robin Hood, the spoiling of the richer classes is depicted as one of the chief virtues. In the course of time, the Normans were absorbed among the Saxons, their very language disappearing, though leaving many traces. From this union arose the English people and the English language as they now exist.

The union of the Normans with the Saxons was not fully effected so long as the

Normans retained their foreign possessions. In king John's reign, the whole of these were lost, excepting Guienne and Poitou. Long wars under Henry III. and Edward I., and his famous son, the Black Prince, were continued, in the endeavor to regain the lost possessions; yet great victories like those of Cressy (1346 A.D.) and Poitiers (1356 A.D.) seemed to leave no result, for no sooner were the English armies withdrawn, than the population returned to their French allegiance. After Agincourt (1415 A.D.), Henry V., when he had forced himself to be acknowledged heir to the French throne, was virtually king of France, and held his court in Paris; yet, in a few years more, the rebellion of Joan of Arc came at a time when E. was weakened with the wars of the roses, and (1451 A.D.) nothing of foreign ground was left to this country excepting Calais.

To their efforts to conquer France, the Norman kings added others. Henry II. conquered Ireland (1171 A.D.), Edward I. conquered Wales (1285 A.D.), and had almost added Scotland to his dominions. The bravery of Wallace and Bruce defeated the armies of Edward II., his successor; and though the idea of the conquest of Scotland was always a favorite one, an opportunity for attempting it on a great scale never again presented itself.

The great struggles of the successors of William were with the ecclesiastics and with the barons. Sometimes in these the popular sympathies were with, and sometimes against the crown. The conqueror himself and his immediate successors had no difficulty in maintaining the superiority of the courts of justice over the ecclesiastics; but even a sovereign so bold and skillful as Henry II. was forced, after the outcry occasioned by the murder of Thomas à Becket (1170 A.D.), to yield the point. The right to nominate the higher ecclesiastics was also secured by the popes. The degradation of the English monarchy was at its lowest when king John consented (1213 A.D.) to hold the crown as a gift from Rome. The weaknesses of this monarch had good as well as evil results, for from him the barons won their great charter (1215 A.D.). From Henry II. something similar had already been gained; but it was the Magna Charta of John which firmly established two great English principles—that no man should suffer arbitrary imprisonment, and that no tax should be imposed without the consent of the council of the nation. Under Edward I., the famous statute that no manner of tax should be imposed without the common consent of the bishops, barons, and burgesses of the realm, was passed (1296 A.D.); and before the time of Henry VII., the foundations of parliamentary government had been laid.

The union of the houses of York and Lancaster under Henry VII. begins a new period in English history. Part of his reign was disturbed by Perkin Warbeck and other pretenders to the throne, in support of whose claims the turbulent nobles found vent for their restlessness. But the greater part of his long reign was distinguished from preceding reigns as a time of peace and economy. During it, men's minds ripened for the great events of the next reign. Henry VIII. succeeded, under the most favorable auspices. He found the alliance of his now important country courted by both of his great contemporaries, Francis I. and Charles V. But the interest of the foreign complications of the reign merges in the struggle between the courts of E. and of Rome. The origin of the contest was the divorce which Henry desired to have from Catharine of Aragon, his brother's widow, to whom he had been married by papal license. Cranmer and the English church pronounced the marriage to be null, but a formal decree of divorce by the head of the church was then thought necessary in Catholic Europe. Pope Clement and the consistory, influenced by Spanish counsels, delayed, by every possible means, the decision of the question. E., however, was ready enough to support Henry. Wickliffe and his adherents had done not a little to shake the attachment of the nation to a foreign spiritual authority, by preaching doctrines which dispensed with the necessity for it. A parliament met, when the commons took the significant step of presenting a long memorial of complaints against the church. The pope, still showing no signs of yielding, bills followed, declaring the king the head of the church; rendering the inferior clergy amenable to the civil courts; abolishing the payment of the first year's fruits of ecclesiastical livings to Rome; and perhaps a more important thing than any of these, declaring that no convocation should meet unless the king should summon it, and that no ecclesiastical canons should have force except with the king's consent. To these measures, the pope replied by refusing the divorce, and excommunicating the king (1533 A.D.). The breach thus became irreparable.

A new act was passed giving to the magistrates the power of judging in questions of heresy. The next step was the suppression of nearly 400 of the smaller monasteries. The subsidence of an insignificant popular reaction, incited by the lower clergy, was followed by the suppression of the great abbeys. All these changes, however, touched only matters of church government. On matters of faith, Henry and his parliaments were as orthodox as the most conservative could wish. They embodied the leading doctrines of Romanism, disputed by the Protestants, in an act of parliament, known among the people as "the bloody six articles," and enforced conformity under severe penalties.

Henry was succeeded by Edward VI. His reign was marked by the general progress which the reformation now made from questions of government to questions of doctrine. More thoroughly than ever the power of the clergy was sapped. The Book of

ENGLAND & WALES

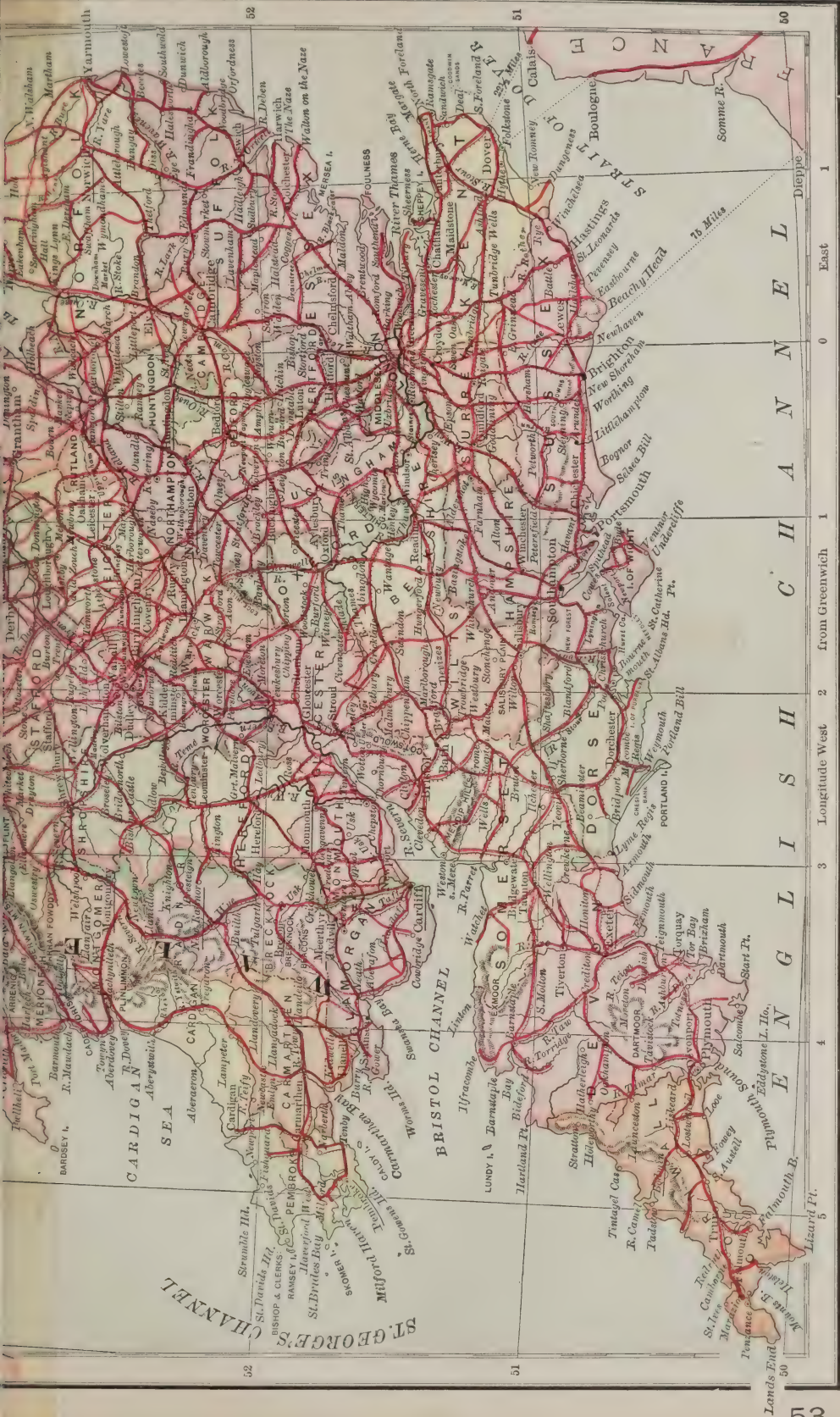
British Miles
0 5 10 20 30 40 50 60 70

Railways shown thus —

N O R T H
S E A



Dublin to Liverpool 138 Miles
To Hullhead 61 Miles
Kingsdown



Common Prayer (1548 A.D.) deprived them of the mysterious authority which the use of a foreign language in worship gave them in the eyes of the people, and the 42 articles of the church of E. (1552 A.D.), the foundation of the present 39, denied, among other things, their power to work miracles in the elevation of the mass.

The next reign saw the inevitable reaction. The superstitions of the populace had been too rudely handled, and—as often happens before a crisis—there came a period of physical suffering. The conversion of cornfields into sheep-walks, induced by the high value of wool as an article of export, had thrown many out of employment; and the country was, moreover, infested with the crowd of vagrants whom the monasteries had been wont to maintain. The popular dissatisfaction coupled these things with the reformation. Thus the opportunity was prepared for the atrocities of the reign of Mary. The queen herself was interested, by her mother's honor and her own, to uphold the Romanist faith; and her gloomy temper, aggravated by her unhappy childless marriage, believed that it did true service to God when it gave the rein to the bigotry of Pole and Bonner. In her first parliament (1553 A.D.), the whole legislation of Edward VI. was repealed, leaving the church of E. one in ceremonial and doctrine with the church of Rome. Another parliament (1555 A.D.) repealed the legislation of Henry VIII., thus re-establishing the papal supremacy. Everything that the reformers had done was thus undone. Still the adherents of the reformation were numerous, and when legislation failed to convert them, the fires of Smithfield were tried. Hooper, bishop of Gloucester, was one of the first to suffer. Latimer, Ridley, Cranmer, followed, and the number who perished is not less than 300 by fire, and 100 by torture and the cruelties of confinement. Nothing more was wanted to turn the popular mind at once and forever from the church of Rome.

The accession of the Protestant princess Elizabeth came as a relief to the whole nation. The Romanists themselves were weary of the policy which made E. the tool of Spain, and were sickened with the cruelties which had been enacted. Elizabeth began by releasing from prison all confined on charges of heresy. Parliament followed (1559 A.D.) with acts restoring the royal supremacy over the church, and returning in general to the legislation of Edward VI. The prayer-book and the 39 articles were adjusted as they still exist. Fortunately for the country, the ministry of Elizabeth, guided by the able hand of Cecil, was one of peace. No opportunity was lost of aiding the Protestant cause throughout Europe; but Elizabeth had almost no open wars, and her long reign was disturbed by almost no domestic collisions. The mistake committed in detaining the queen of Scotland in an English prison, gave a constant incitement to disaffection among the adherents of the old faith, but no serious consequences ensued. Towards the close of the reign, Protestant and Catholic were alike patriotic in repelling the Armada (1588 A.D.). On the death of Elizabeth, the crowns of E. and Scotland were united.

The reign of James VI does not present much that is remarkable. The plot, for which sir Walter Raleigh suffered long afterwards, and the Gunpowder plot—the insignificant proportions of which were so magnified for factious purposes—disturbed the earlier years; and the close of the reign found the nation engaged in an unfortunate war to assist the king's son-in-law, Frederick, elector of Bohemia, against the emperor Ferdinand II. of Germany. But for the greater portion of the 23 years of the reign there was neither foreign nor domestic war. These years the king occupied industriously in rendering monarchy odious and contemptible. He lavished money upon unworthy favorites, and to supply his extravagance, openly sold the dignities of the peerage and the other honors of the state. His personal demeanor was vain, weak, and ridiculous; but in contrast with the insignificance of his talents was his extravagant conception of the extent of his royal prerogative. His conduct occasioned great discontent in parliament, and but for his timidity might have led to more serious consequences.

The misfortunes of Charles I. were the legitimate result of the principles of his father. Charles committed the mistake of repeating, in the 17th c., acts which the Plantagenet sovereigns had done with impunity in the 14th and 15th. One of his first acts was to exact a benevolence to carry on the war. Had he been successful, this might have been overlooked, but when the bad management of the duke of Buckingham lost the fleet off Rochelle, the indignation of the commons was without bounds. In place of taking measures to allay this feeling, the king dissolved the parliament, and resolved to govern without calling another. In 1630, he concluded peace, and for the next seven years, in council with Strafford and Laud, he carried on the government. Taxes were raised as before without parliamentary authority; and when the taxes failed, money was raised by selling to the Roman Catholics immunities from the penal laws against their worship.

Nevertheless, there were limits to these methods of raising money; and in 1637, when the king found himself involved in a war with Scotland, in consequence of his endeavor to introduce a liturgy there, he was compelled to call a parliament. The commons refused supplies, and were again dissolved. In 1640, the king once more summoned a parliament. He found the temper of the houses more indomitable than ever. In place of voting him supplies, they impeached his minister Strafford, and condemned him to death. The commons then presented a grand remonstrance to the king, embodying all the grievances the nation had suffered since the death of Elizabeth. Matters proceeded from bad to worse, till an open rupture came, and an appeal was made to arms. In Aug.,

1642, the king erected his standard at Nottingham, while the rebels took arms under the earl of Essex. The first conflict was at Edgehill, where the loss on both sides was severe and nearly equal. The fortune of war continued to vary, till at Marston Moor it turned against Charles, and at Naseby, in June, 1645, he was finally defeated. He was executed on 30th Jan., 1649.

The government for the next four years was conducted by parliament. Meanwhile, Cromwell was rising into distinction, and power gradually fell from the hands of parliament into those of the military. In 1653, Cromwell had himself proclaimed "Protector." He was now absolute monarch. He governed with a firm hand, and never was E. more respected abroad than during his time. In 1654, he concluded peace with Holland, and employed the gallant Admiral Blake in an expedition against the Spaniards, which ended brilliantly for the English navy. But the nation grew as discontented with the government of Cromwell as it had been with that of Charles. After the death of the protector in 1658, and a short interval during which his son Richard held the office, parliament received with acclamations a proposal from Charles II. to return. In May, 1660, the populace clamored with delight on the royal entry to London of him who, a few years before, had fled from Worcester for his life.

While Clarendon was minister, the government of Charles II. was well conducted. A war with Holland was brought to a successful ending in the conquest of New York. On Clarendon's resignation, the government passed into the hands of the ministry known as the Cabal. They were as profligate and as careless as the king himself. A succession of cruelties against the Catholics, for which the pretended revelations of Titus Oates and his imitators furnished the excuse, betokened rather the wanton temper of the sovereign and the nation, than any zeal for the Protestant religion. The only act which reflects much credit on any portion of the reign was the passing, in 1679, of the *habeas corpus* act, designed more effectually to protect the liberty of the person. Strong efforts were made in parliament after that to pass the exclusion bill, the object of which was to exclude the duke of York, as a Roman Catholic, from the succession. To the great satisfaction of the king, parliament rejected the bill. In 1681, parliament was dissolved, and Charles II. never called another.

After this there was a change for the worse in the character of the government; from being wantonly indifferent, it became sullenly mischievous. Presbyterians and non-conformists were excluded from all offices. Among other arbitrary acts, may be mentioned the recall of their charters from London and many of the other principal cities, which were only restored, with diminished privileges, on payment of heavy fines. Conduct such as this made men more than ever afraid of the succession of the king's brother. A conspiracy to secure the succession to the duke of Monmouth, an illegitimate son of the king, was formed. Lord Howard betrayed the conspiracy, and among others who suffered death for it were lord Russell and Algernon Sidney.

When the king died, in 1685, James II. succeeded amid universal dissatisfaction. Monmouth's attempt to seize the throne, however, was mismanaged, and failed. The punishment of those who had aided his rising formed an occasion for the perpetration of great cruelties by Jeffreys, then chief-justice of England. In the meantime, nothing could be fairer than the king's language. He issued a declaration in favor of general toleration, and announced that the penal laws against Catholics were no longer to be enforced. A second declaration to the same effect was issued, but he went further, and added to it an order that the clergy should read it in all churches. The archbishop of Canterbury and six bishops presented an address to the throne, humbly setting forth that their duty to maintain the Protestant establishment would not permit them to give obedience to the royal mandate. For this they were indicted as guilty of sedition. The trial of the bishops (1688 A.D.) was the turning-point of James's career. It created immense excitement, and when the jury returned a verdict of not guilty, even the soldiers joined in the tumultuous rejoicings.

William, prince of Orange, who had married Mary, the eldest daughter of the king, had long been intriguing with the malcontents. He now landed in E. with a small body of troops. The soldiers, the leading nobles, even the king's own children, joining the prince, the king fled to France. Parliament then settled the crown jointly on William and Mary for life. James, with the assistance of Louis XIV., made one effort to regain his throne. He landed in Ireland, where the lord lieutenant, Tyrconnel, was devoted to his cause, and managed to raise an army. William defeated him at the battle of the Boyne; and the contest was soon after this terminated by the second flight of James to France. So easily was the great revolution of 1688 effected.

The domestic government of William was marked by his efforts to introduce a general toleration; but of his foreign administration, which led the country into costly wars, it is hardly possible to speak in very favorable terms. To reduce the threatening power of France, E., in alliance with Holland and Germany, embarked in a protracted contest. Its termination at the peace of Ryswick, in 1697, brought to E. nothing beyond an increase of reputation. William died in 1702.

Under queen Anne, the war with France was renewed, and the duke of Marlborough's splendid victories of Oudenarde, Blenheim, and Ramilies were achieved. With these the history of E. as a separate state closes. In 1707, the long-wished-for union with Scotland was accomplished; and after that, Great Britain, united under one legislature,

as well as under one crown, has a common interest among nations, and therefore a common history. For the history of the United Kingdom, see the article GREAT BRITAIN.

A table of the English sovereigns is appended, beginning with Alfred, and continued, for convenience' sake, to the present time:

| | | Began to Years of | | | | Began to Years of | |
|---|------|-------------------|--------|---------------------|------|-------------------|--------|
| ANGLO-SAXON LINE. | | Reign. | Reign. | HOUSE OF LANCASTER. | | Reign. | Reign. |
| Alfred, king of Wessex | 871 | 30 | | Henry IV. | 1399 | 14 | |
| Edward I., king of Wessex, Mercia, etc. | 901 | 24 | | Henry V. | 1413 | 9 | |
| Athelstan, king of England | 925 | 15 | | Henry VI. | 1422 | 39 | |
| Edmund I. | 940 | 6 | | HOUSE OF YORK. | | | |
| Edred | 946 | 9 | | Edward IV. | 1461 | 22 | |
| Edwy | 955 | 4 | | Edward V. | 1483 | | |
| Edgar | 959 | 16 | | Richard III. | 1483 | 2 | |
| Edward II. | 975 | 3 | | HOUSE OF TUDOR. | | | |
| Ethelred | 978 | 38 | | Henry VII. | 1485 | 21 | |
| Edmund II. | 1016 | 1 | | Henry VIII. | 1509 | 38 | |
| DANISH LINE. | | | | Edward VI. | 1547 | 6 | |
| Canute | 1017 | 19 | | Mary | 1553 | 5 | |
| Harold I. | 1036 | 3 | | Elizabeth | 1558 | 45 | |
| Hardicanute | 1039 | 2 | | STUART LINE. | | | |
| SAXON LINE. | | | | James I. | 1603 | 22 | |
| Edward III. | 1041 | 25 | | Charles I. | 1625 | 24 | |
| Harold II. | 1066 | — | | Commonwealth | 1649 | 10 | |
| NORMAN LINE. | | | | STUART LINE. | | | |
| William I. | 1066 | 21 | | Charles II. | 1660 | 25 | |
| William II. | 1087 | 13 | | James II. | 1685 | 3 | |
| Henry I. | 1100 | 35 | | HOUSE OF ORANGE. | | | |
| HOUSE OF BLOIS. | | | | William and Mary | 1688 | 14 | |
| Stephen | 1135 | 19 | | STUART LINE. | | | |
| PLANTAGENET LINE. | | | | Anne | 1702 | 12 | |
| Henry II. | 1154 | 35 | | BRUNSWICK LINE. | | | |
| Richard I. | 1189 | 10 | | George I. | 1714 | 13 | |
| John | 1199 | 17 | | George II. | 1727 | 33 | |
| Henry III. | 1216 | 56 | | George III. | 1760 | 60 | |
| Edward I. | 1272 | 35 | | George IV. | 1820 | 10 | |
| Edward II. | 1307 | 20 | | William IV. | 1830 | 7 | |
| Edward III. | 1327 | 50 | | Victoria | 1837 | .. | |
| Richard II. | 1377 | 22 | | | | | |

ENGLAND, CHURCH OF. A brief sketch of the origin and early history, as well as an outline of the doctrines and form of government of this church, will be found under the head **ANGLO CATHOLIC CHURCH**. See also the articles **AUGUSTINE** and **DUNSTAN**. Up to the time of the reformation, ecclesiastical affairs would be more properly described as the history of the church *in* England; from that period the church *of* England dates her existence. She, however, retains so much of antiquity, and her institutions, laws, and formularies are so interwoven with the history of the past, that it would be impossible to have any correct or connected view of them, and of her *connection with the state*, her characteristic feature, without at least glancing rapidly over the leading events between the conquest and the reign of Henry VIII. During the three centuries from the Norman conquest (1066) to the preaching of Wickliffe (1356), her history can be regarded only as a continual struggle between the ecclesiastical and civil power, and there would be little else to describe than the methods by which the miter triumphed over the crown, and the crown invaded the rights and property of the church. In the time of William I., nearly half the country was in the hands of spiritual persons. He ejected the English clergy, and supplanted them with Normans; and although he was possessed of full power over the church, yet in his reign were sown the seeds of future papal encroachments. Papal legates were then first introduced into England, and the ecclesiastical courts separated from the civil. From this time, the increased influence of Rome may be traced to the defective titles, the usurpations, and the violent conduct of the kings. Thus, the defective title of Henry I. made him seek popularity by recalling the primate Anselm, who had incurred the displeasure of his brother William, and had fled the country. Anselm was devoted to the pope, who had espoused his quarrel, and refused to do homage to the king for the temporalities of his see, till at length Henry found himself obliged to surrender the right of *investiture*. Thus, too, Stephen's usurpation opened the way for further encroachments; and Henry II., who found the power of Rome greatly augmented, helped to extend it further, by accepting a grant of Ireland from the pope. Then followed the opposition of Thomas à Becket, which arose out of the question of the punishment of ecclesiastics by the civil power. For the moment, it seemed that the quarrel was healed by the *constitutions* agreed on at Clarendon (q.v.), but it broke out more violently than ever. The pope discharged Becket from his oath, and condemned the constitutions. Becket had fled from the kingdom; and his subsequent return, murder, and canonization, all tended to strengthen the authority of the church. It was not, however, till the reign of John, when England was laid under an interdict, and the king resigned his crown to the pope, that the papal encroachments rose to their height; and the weak reign of Henry III., which followed, did nothing to abate them. Edward I. gave a check to the power of the clergy, subjoined them to taxation, and passed the statute of Mortmain (1279), which prohibited

the transfer of land without the king's consent. There is little to be said as to innovations in doctrine during these three centuries; but it may be noted, that about the middle of this period, viz., 1213, the council of St. John Lateran declared transubstantiation, or the bodily presence of Christ in the consecrated elements, to be a tenet of the church.

It was in 1356 that a new period commenced. Wickliffe then published his first work, entitled *The Last Age of the Church*, directed against the covetousness of the church of Rome. His doctrines correspond in many points with those now taught by the church of England, but he differed from her in regard to the necessity of episcopacy, which he rejected; he also believed in purgatory, and enjoined prayers for the dead. His chief objects of attack were the papal indulgences, and the doctrine of transubstantiation. It has been observed concerning the condemnation at Oxford of Wickliffe's opinions with respect to the latter, that "this was the first plenary determination of the church of England in the case, so that this doctrine, which brought so many to the stake, had but with us 140 years' prescription before the times of Martin Luther." In a limited sense, he upheld the efficacy of the seven sacraments. Wickliffe had a large body of followers. They were called *Lollards*, probably from a German word, *lullen*, to sing with a low voice. The storm of persecution which he escaped by death, fell upon them. Henry IV. thought it necessary to fortify his usurped position by assisting the bishops against the Lollards; and from this time to the reformation, there was an uninterrupted succession of confessors and martyrs. Sir John Oldcastle, lord Cobham, was the most illustrious of these sufferers. Fox gives a detailed account of nearly 20 individuals burned for heresy between the death of lord Cobham and 1509, when Henry VIII. ascended the throne. To some extent, the blood of these martyrs was the seed of the Reformed church; but we must not overlook the "hidden seed" which was growing secretly, from the time that Wickliffe gave to his countrymen a translation of the Scriptures in their own tongue. The progress of learning, and especially the study of Greek, led to a better understanding of the sacred books, whilst the invention of printing (1442) caused a wider circulation of them.

The above causes, however, would probably have proved insufficient to produce the great change which was now impending, had not Henry VIII.'s divorce from Catharine of Spain led to a quarrel between him and the pope, which ended in the total abolition of the papal authority within the kingdom. Then began the REFORMATION in earnest. For the details of that great event, consult the article under that head, and the lives of such men as Wolsey, sir Thomas More, Fisher, Clement, Luther, Cromwell, Cranmer, Latimer, and Ridley, etc. From this period may be dated the existence of the church of England as a separate body, and her final separation from Rome. For the opinions of the church in Henry's reign, two important books which were then published should be consulted—viz., the *Bishop's Book*, or the *Godly and Pious Institution of a Christian Man*, and the *King's Book*, which was a republication of the same in a more perfect form in 1543, and called *The Necessary Erudition for any Christian Man*, and was called the *King's* book because put forth by royal authority. A book of *Articles devised by the Kinges Highnes Majestie to stablyshe Christen Unitie*, should also be consulted. It has been stated in the article ANGLO-CATHOLIC CHURCH, that the reformation in doctrine did not make much progress in Henry's reign; from these books, it will be seen that it was rather retrograde. The monks, too, who were dispossessed at the dissolution of the monasteries, were dispersed amongst local cures, and kept alive the old opinions, and the lower orders were not as yet favorable to the new doctrines. Cranmer was the leader and presiding genius of the reformed opinions; and the youth of Edward VI. left the king pliant in the hands of the archbishop. The book of Homilies, put forth in 1540, the New Communion Service and Catechism in 1548, the first Book of Common Prayer in 1549, and the Forty-two Articles in 1553, all bear the impress of his hand, and it was these which advanced and fixed the doctrines of the reformation. Nor was the temporal authority idle on the same side—Bonner and Gardiner were committed to prison, and both were deprived of their bishoprics. In fact, the way in which all the institutions of the church of England were established in Edward VI.'s reign by the help of the civil magistrate, have brought upon her the charge of Erastianism. The civil power had just delivered her from a foreign tyranny; and when the weak health of the young king, the known sentiments of his successor, Mary, the ignorance of the common people, and the interested views of the old clergy, are considered, it cannot be a matter of surprise, still less of blame, that the same arm was relied upon for the establishment of the new forms of religion.

Although Mary promised at her accession that she would put constraint on no person's religion, her promise was not kept. Bonner and Gardiner were restored; the Book of Common Prayer and Catechism were declared heretical; the kingdom was reconciled to the see of Rome; a persecution of the chief reformers commenced—Rogers was burned at Smithfield, Hooper at Gloucester, Saunders at Coventry, Taylor at Hadley. The prisons were filled with "heretics;" many fled beyond sea; some purchased safety by an outward conformity. Cranmer, Latimer, and Ridley perished in the flames at Oxford. Cardinal Pole was made primate. One benefit was conferred on the church by Mary—she surrendered all the church lands, as well as the first fruits and tenths, which had been seized by Henry. At last the death of Mary, with which that of the

cardinal was all but simultaneous, delivered the church from its oppressors. The passing of the *act of uniformity* in the first year of Elizabeth's reign, restored the common prayer-book to general use, and enjoined the same dresses as were in use at the time of the first prayer-book of Edward VI. All the bishops except one, Kitchin of Llandaff, refused to take the oath of uniformity, and were ejected from their sees to the number of 14 (the eleven remaining sees were vacant by deaths), and 175 other beneficed clergy were deprived for the same cause—no very considerable number, when it is remembered that there were then 9,400 benefices in England. There was some difficulty in filling up the vacant bishoprics, and perhaps some slight informalities. Matthew Parker was made archbishop of Canterbury. For the refutation of the fable of the NAG'S-HEAD CONSECRATION, see the article under that head. In 1562, the Thirty-nine Articles were finally reviewed and subscribed. These, with the Book of Common Prayer, are the tests of orthodoxy in the church of England.

But what was done to satisfy the scruples of Protestant non-conformists? An attempt in this direction was made in the reign of James I. at the Hampton Court conference (q.v.). The result was another review of the common prayer-book; and this, with the new translation of the Bible, and the passing of the canons of 1604, were the principal ecclesiastical events of James' reign. These canons received the sanction of the crown, but not that of parliament; they are not, therefore, binding on the laity, but they are still binding on the clergy to some extent, and they regulate the practice of the ecclesiastical courts, and are the only rule, on some points, to which the bishops and clergy can appeal. See the articles LAUD, and SCOTLAND, CHURCH OF, for the events of Charles I.'s reign. The great rebellion overthrew both church and state. The bishops were declared "delinquents," robbed of their property, and abolished; and the clergy were ejected from their benefices. Laud was put to death in 1645. The church of England had no corporate existence during this interval. With the restoration of the monarchy, 1660, came the restoration of the church. The reaction from Puritanism to Prelacy was complete. Attempts were made, but with small success, to win over the Puritan leaders; bishoprics were offered to Baxter, Calamy, and Reynolds; but the last only accepted. The Savoy conference (q.v.) was an unsuccessful, perhaps insincere attempt to comprehend the non-conformists in the established church. But the demands of the Presbyterians were most immoderate. Baxter went so far as to propose the substitution of an entirely new book of his own composition, in the place of the common prayer-book. After the failure of the Savoy conference, this was once more reviewed; and a new act of uniformity in 1662 made its use, as it now stands, compulsory in all the churches.

The church of England passed through one more critical period before reaching that tranquillity in which, for upwards of a century, she slumbered too securely. In 1687, James II. published the famous declaration of indulgence, which filled up the measure of popular discontent, and finally cost him his crown. Although by this declaration, which was perfectly illegal, liberty of conscience was permitted to all his subjects, it was clearly understood that the liberty was intended only for the papists. The nonconformists refused to accept the treacherous boon. Eighteen bishops out of twenty-five refused to publish the declaration, as ordered, in their dioceses. Seven of them—Sancreft, Lloyd, Ken, Turner, Lake, White, and Trelawney—drew up a remonstrance to the king; they were summoned before the privy council, and sent to the Tower. The whole city was in commotion; and great was the rejoicing when, on being brought to trial in Westminster hall, they were acquitted. On the 5th of Nov. following, 1688, the prince of Orange landed in England. It is worthy of remark, that out of these seven bishops three refused to swear allegiance to him, and were joined by a considerable number of the clergy; these were called Non-jurors. In the first year of William and Mary's reign, the toleration act was passed, and dissent ceased to be illegal. Another attempt was made to comprehend the nonconformists in the church, but the lower house of convocation was in no tolerant mood, and the attempt failed, but chiefly in consequence of the disturbances in Scotland. In 1717, convocation was dissolved. After slumbering for nearly 140 years, it was once more called into life and action in the province of Canterbury in 1853, under the ministry of the earl of Aberdeen, and a few years later the convocation of York also took advantage of the liberty accorded by the crown on the advice of this government. See CONVOCATION.

That the church of England, after fighting for its very existence against popery on the one hand, and against Puritanism on the other, should have subsided into inactivity during the dull reigns of the Georges, is less a matter of surprise than of regret. The peaceful enjoyment of her temporalities in a dull, irreligious, not to say infidel age, may easily account for, though it cannot excuse, her idleness. But that in the rise of John Wesley, 1730, she should have failed to see a grand opportunity for herself, is a matter of both surprise and regret; she, however, let it pass; perhaps she can hardly hope that such another will ever again present itself. The utmost that can be hoped is, that she has seen her error. The next important event in the history of the church is the act of union, which came into effect on the 1st of Jan., 1801, and united the churches of England and Ireland in all matters of doctrine, worship, and discipline. The reformation had made some progress in Ireland under Edward VI. Five Protestant bishops were appointed in 1550, and the English Bible and liturgy were introduced in 1551; but

from a variety of causes, the reformed doctrines have never found much acceptance with the native population; and although a Protestant church was established by law, it was and is the church of the minority (see IRELAND). In 1635, the English articles were received; and in 1662, the English book of common prayer was adopted by convocation. Before the political union of the countries, the two churches were in full communion. By an act of the imperial parliament in 1833, ten of the Irish bishoprics were suppressed, and the funds thus obtained were applied to the augmentation of small livings and the building and repair of churches. There are now twelve Irish bishops. But in 1869, the Irish church was disestablished and disendowed; and this branch of the Anglican community now stands in much the same relation to the church of England as does the Episcopal church in Scotland.

In later times, three great controversies have shaken the English church, which have led to some great reforms, some internal divisions, and the secession of some members to Rome, of a few to the ranks of dissent. These were the Tractarian, the Gorham, and the Essays-and-Reviews controversies. The former was occasioned by some tracts which began to be published at Oxford in 1833, the object of which was to revive something of the spirit of Catholic antiquity, and reform the abuses and slovenly practices which had crept into every part of the church system. See TRACTARIANISM. The Gorham controversy (q.v.) related to the doctrine of baptismal regeneration. The Tractarians are accused of Romanizing tendencies; and their views, when carried to extremes, undoubtedly lead in that direction, as is proved by the numerous secessions to that church. With the extreme low church party, episcopacy is rather an expedient than a necessary form of church government. They think but little of the efficacy of sacraments, and deny that regeneration necessarily takes place in infant baptism. Justification by faith, the atonement of the cross, and the Calvinistic doctrines on election, are their leading topics in preaching. Charles Simeon (q.v.) and Henry Venn (q.v.) were leaders in this party.

The Essays-and-Reviews controversy (so called from a book thus named) concerned what are called BROAD CHURCH views, which are attributed to men of the Arnold school, and the followers of Mr. Maurice (q.v.). Those who hold them can scarcely be called a party, and are, indeed, unwilling to be so considered; but if their position must be defined, they might be described as a party between, and somewhat antagonistic to, both the high and low church parties. The high church party insist on the authority of the church and priesthood, the efficacy of sacraments when rightly received, and the necessity of apostolical succession in the matter of orders, and in their general teaching they take the prayer-book as the exponent of Scripture. They are scrupulous in observing the rubrics, and have done much to revive the practice of daily prayer in the churches, and the observance of the festivals. Order, unity, antiquity, and catholicity are what they profess to have in view. See RITUALISM.

There are at present, in round numbers, 13,000 benefices in England and Wales, of which a large number are new districts, which are being continually formed out of the old large and overpopulous parishes. These districts are called perpetual curacies, or incumbencies, and for the most part are but very slenderly endowed. The old benefices are either rectories, where the incumbent receives the *great* or corn tithes, or vicarages, where he receives the small tithe only. The great tithes had anciently been bestowed upon the neighboring monasteries, who undertook the cure of the souls and appointed vicars for the purpose, who lived on the small tithes and the offerings of the people. At the dissolution of the monasteries, many of the great tithes were given to laymen, and laymen now extensively hold them, and some to endowed colleges. The endowments were all by private beneficence, and there is no tenure so ancient as that by which the parish church holds her property. The aggregate amount was ascertained by the commission appointed in 1830 to be as follows: Bishops, £181,631; deans and chapters, £360,095; parochial clergy, £3,251,159; total annual revenue, £3,792,885. In 1891 the revenues of the church, from endowments in tithes, land and offerings, were estimated at £8,000,000. The church rates, amounting to £500,000 annually, were no part of the minister's endowment; they were exclusively devoted to the repairs of the church fabric, and the warming, lighting, cleaning, etc., of the church; and were under the exclusive control of the church-wardens. Of these there are two in each parish, one generally nominated by the minister, the other elected by the parishioners. The payment of church rates is no longer compulsory. The church accommodation (1896) was represented by 6,000,000 sittings.

The church of England has three orders of clergy—bishops, priests, and deacons. Generally, a degree at one of the English universities, or at Dublin, is required in a candidate for orders; but in Wales and some of the more populous districts, this condition is dispensed with. In England and Wales there are two archbishops (Canterbury and York) and 33 bishops; besides 2 archbishops and 11 bishops in Ireland. There are also 17 suffragan and 5 assistant bishops, 31 deans, 91 archdeacons, 810 rural deans, about 14,200 beneficed clergy, and about 7,400 curates. See GREAT BRITAIN.

The patronage of the church is in a great variety of hands—in the crown, the bishops, the nobles, and the gentry, and incorporate bodies such as colleges and cathedrals. Advowsons and next presentations may be sold as property, but a presentation may not be sold when a living is vacant. A clergyman is "presented" to his living by the

patron; he is admitted and inducted by the bishop or his appointee; he must "read himself in," i.e., he must read the Thirty-nine Articles after the morning or evening prayer within two months after induction. The bishop may refuse institution on the ground of false doctrine or immorality; but an appeal lies to the Archies court and the head court of appeal.

The Episcopal church in Scotland is not, politically speaking, in union with that of England. But an act of parliament, passed in 1864, has taken away many restrictions imposed on Scottish Episcopalians after the battle of Culloden; and clergy ordained by Scotch bishops may now, under some slight restrictions, be presented to benefices in England. Events connected with the colonies have also drawn these two communions into closer alliance; and some bishops, selected by English authorities for foreign parts, have been consecrated in Scotland.

The above sketch has been largely drawn from Short's excellent *History of the Church of England*; see also Marsden's able *Dictionary of Christian Churches and Sects*, and Hardwick; also Fuller's *Church History*, Collier, Strype, Mosheim, Burnet, and Clarendon. Among the great divines whose works should be consulted for further information regarding the views of the church, may be named Barrow, Pearson, Hooker, Jeremy Taylor, Lightfoot, Hammond, Sancroft, South, Tillotson, bishop Butler, Atterbury, Bull, Sherlock, and others. See EPISCOPACY; ARCHBISHOP, BISHOP; DEAN.

ENGLAND, FREE CHURCH OF. See REFORMED EPISCOPAL CHURCH.

ENGLANTE, in heraldry, is bearing acorns or other similar glands.

EN'GLESHERY, EN'GLESBURY, i.e., being an Englishman. The presentment of Engleshery is thus explained, Hale's *Pl. of Crown*, p. 446: "Anciently, there was a law introduced by Canutus the Dane, that if any man were slain in the fields, and the manslaughter were unknown, and could not be taken, the township where he was slain should be amerced to 66 marks; and if it were not sufficient to pay it, the 100 should be charged, unless it could be made appear before the coroner, upon the view of the body, that the party slain was an *Englishman*; and this making it appear was various according to the custom of several places, but most ordinarily it was by the testimony of two males of the part of the father of him that was slain, and by two females of the part of his mother." William the Conqueror continued this law. Presentment of E. was taken away 21 Edw. III. st. 1. c. 4.

ENGLEWOOD, a city (incorporated 1896), in Bergen co., N. J., 15 m. n. of New York, on the West Shore and the Northern New Jersey railroads. It is occupied chiefly by the families of men who do business in New York and has large boarding houses, several churches, hospital, public library, national bank, electric railroad, weekly newspapers, and several high grade schools. It is noted for fine scenery and cultivated society. Pop. '90, 4785.

ENGLISH, forms the first part of several geographical names.—1. English cove is a bay of the Pacific ocean, on the s.w. coast of the island of Neu-Mecklenburg (formerly New Ireland) in the Bismarck Archipelago.—2. English harbor, on the s. coast of Antigua, is one of the best havens in the West Indies. It is situated in lat. 17° 3' n., and long. 61° 45' west.—3. English harbor is on the Pacific shore of Costa Rica, in Central America, lying in lat. 8° 50' n., and long. 83° 55' west.—4. English river is an estuary on the w. side of Delagoa bay, an inlet of the Indian ocean, in Africa. It is about lat. 25° 58' s., and long. 32° 36' east.—5. English river, otherwise known as Mississippi or Churchill, enters Hudson's bay from the w. at fort Churchill, about lat. 59° n., and long. 94° w., after an estimated course of 800 miles.

ENGLISH, GEORGE BETHUNE, 1787-1828; b. Mass.; graduated at Harvard, and was a member of the Boston bar, but finally studied divinity. He published *The Grounds of Christianity Examined*, a work favoring Jewish views. After editing a paper in the west, he became a lieutenant of marines, and went on service in the Mediterranean, resigned his commission, became a Mohammedan, joined the army of Ismail Pasha in 1820, and served in the artillery in the expedition against Sennaar. He was subsequently agent for the United States government in the Levant, returning home in 1827. He published *Narrative of the Expedition to Dongola and Sennaar*.

ENGLISH, JAMES EDWARD, b. New Haven, Conn., 1812; was a member of the Conn. house of rep., 1855; and of the state senate, 1856-58; was elected as a democrat from Conn. to the XXXVIIth, and re-elected to the XXXVIIIth congress; was elected gov. of Conn., 1867, defeating Joseph R. Hawley; re-elected, 1868, defeating Marshall Jewell. E. was for the third time elected gov. in 1880; and was appointed U. S. senator from Conn., 1875, to fill the vacancy caused by the death of Orris S. Ferry. He d. in 1890.

ENGLISH, THOMAS DUNN, b. Philadelphia, 1819; studied medicine and law, but soon devoted his whole attention to literature, editing newspapers and magazines, and writing novels, dramas, poems, etc. His song of *Ben Bolt* is widely known. He was a democratic member of congress from New Jersey in 1891-5, and composed *Old Glory*, a patriotic march song, in 1895.

ENGLISH, WILLIAM HAYDEN, b. Ind., 1822. He studied law, and in 1843 was chosen clerk of the Indiana house of representatives. In 1851, he was made speaker of the

legislature, and in 1852 was elected to congress, holding his seat till 1860, when he retired from active political life. His chief title to distinction was his nomination for vice-president of the United States by the democratic national convention, in 1880, on the ticket with Gen. Winfield S. Hancock for president. He d. in 1896.

ENGLISH or BRITISH CHANNEL (*La Manche* or the *Sleeve* of the French, and the *Oceanus Britannicus* of the Romans) is the narrow sea which separates England and France, having on the n. the English counties of Kent, Sussex, Hants, Dorset, Devon, and Cornwall; and on the s. the French provinces of Artois, Picardy, Normandy, and Bretagne. On the e., it joins the North sea, at the strait of Dover, where it is narrowest, being only 21 m. wide from Dover to cape Grisnez. From this strait it runs w.s.w. for 280 m., and joins the Atlantic ocean at the Chops, with a breadth of 100 m. between the Scilly isles and Ushant isle. With an average breadth of 70 m., it is 90 m. wide from Brighton to Havre; 60 m. from Portland Point to cape La Hague; 140 m.—its greatest breadth—from Sidmouth to St. Malo; and 100 to 110 m. w. of the latter line. It occupies 23,900 sq. geographical m., and includes the Scilly isles, Channel isles, Ushant isle, isle of Wight, and many islets and rocks, especially off the coast of Bretagne. It is shallowest at the strait of Dover, where a chalk-ridge at the depth of 12 to 30 fathoms joins England and France. W. of this, it deepens to 60 fathoms, with some banks at 3 to 5 fathoms, and some hollows 5 to 30 fathoms deeper than the parts around. A coarse gravel covers the bottom. The English coast-line of the E. C. is 390 m. long, with an inshore depth of 12 to 55 fathoms, and the French coast-line of the E. C. is 570 m. long. Westerly winds prevail in the E. C., and the current, though imperceptible, is always from w. to east. The E. C. abounds in fish, of which the chief are pilchard, mackerel, and oysters.

ENGLISH CONSTITUTION. See PARLIAMENT.

ENGLISH DRAMA. See DRAMA.

ENGLISH LANGUAGE, which is now spoken by nearly 80 millions of the earth's inhabitants, is in its vocabulary one of the most heterogeneous that ever existed; a fact, the causes of which are to be traced in the history of England (q.v.). Its composition and grammatical character are thus described by M. Müller in his *Lectures on the Science of Language* (1861). "There is, perhaps, no language so full of words evidently derived from the most distant sources as English. Every country of the globe seems to have brought some of its verbal manufactures to the intellectual market of England. Latin, Greek, Hebrew, Celtic, Saxon, Danish, French, Spanish, Italian, German—nay, even Hindustani, Malay, and Chinese words—lie mixed together in the English dictionary. On the evidence of words alone, it would be impossible to classify English with any other of the established stocks and stems of human speech. Leaving out of consideration the smaller ingredients, we find, on comparing the Teutonic with the Latin, or Neo-Latin, or Norman elements in English, that the latter have a decided majority over the home-grown Saxon terms. . . . M. Thommerel, who counted every word in the dictionaries of Robertson and Webster, has established the fact, that the number of Teutonic or Saxon words in English amounts to only 13,230 against 29,853 words which can either mediate or immediately be traced to a Latin source. On the evidence of its dictionary, therefore, and treating English as a mixed language, it would have to be classified together with French, Italian, and Spanish as one of the Romance or Neo-Latin dialects. Languages, however, though mixed in their dictionary, can never be mixed in their grammar. . . . We may form whole sentences in English consisting entirely of Latin or Romance words; yet whatever there is left of grammar in English bears unmistakable traces of Teutonic workmanship. What may now be called grammar in English, is little more than the terminations of the genitive singular and nominative plural of nouns, the degrees of comparison, and a few of the persons and tenses of the verb. Yet the single *s*, used as the exponent of the third person singular of the indicative present, is irrefragable evidence that in a scientific classification of languages, English, though it did not retain a single word of Saxon origin, would have to be classed as Saxon, and as a branch of the great Teutonic stem of the Aryan family of speech." See PALEOGRAPHY; PHILOLOGY.

In tracing the growth of the E. L., the history is usually divided into *four* leading periods: the *Anglo-Saxon period* (440 A.D. to 1066 A.D.); the *Semi-Saxon period* (from 1066 A.D. to 1250 A.D.); the *Early English period*, comprising the two periods of *old* and *middle English* (from 1250 A.D. to 1550 A.D.); and the *Modern English period* (from 1550 A.D. to the present time). But this nomenclature and these divisions are now impugned by an increasing number of scholars, who affirm, not without reason, that English was always English, and never "Anglo-Saxon;" that the fact of its being inflected in the period before the Norman conquest, and losing most of its inflections in later times, is no reason at all for speaking of it as if it were two or even three different languages, and that we have no warrant in the usage of the inflected period for calling our forefathers or their speech anything but English. It is certainly very misleading to name the period immediately succeeding the conquest *Semi-Saxon*, because it induces people to imagine that the so-called "Saxon," that is, the English, element of our language had begun to be mixed up with foreign ingredients, though, in point of fact, its two great monuments, *The Chronicle*, and Layamon's *Brut*, are all but absolutely free from such. It is proba-

ble, therefore, that the old divisions and their designations will before long be abandoned, and they are only retained here out of respect to a usage which has penetrated modern English literature.

As early as the 5th c., Teutonic invaders from the continent settled in this country, and drove the original Celtic-speaking inhabitants to the n. and w. of the island; so that before the battle of Hastings (1066), the tongue of the conquerors had been spoken in England for at least 600 years. The final absorption, after numerous conflicts, by the kings of Wessex, or West Saxons, of the various states of the "Heptarchy," in the 9th c., went far to make the ruling speech of the land identical with that of Berkshire and Hants, the recognized center of the predominant sept. The use, besides, of this southern Anglo-Teuton speech as the chief instrument of literary communication, was permanently confirmed by the influence of king Alfred, a native of Berks. Further back than the time of this literary monarch, few existing remains of the language permit us to go; yet, from the writings of Cædmon, who was a North Anglian, and a few ecclesiastical MSS. of the kingdom of Northumbria, which extended from the Humber to the firth of Forth, it has been generally concluded that at least two dialects must have been used in the island—a northern and a southern one. The Anglian or northern dialect was, to some slight extent, marked by Scandinavian features; while the Saxon or southern dialect was more purely Low-Germanic, though the Anglian was also Low-German in all essentials. Some have accounted for the partial approximation of the Anglian dialect to Scandinavian by the fact that the Danes, at a later period, effected a settlement in the n.e. of England; but on the other hand, it is argued that "certain peculiarities of a Scandinavian character are to be found in the Anglian, even of a date anterior to the first Danish occupation of a part of England in the latter half of the 9th century." Nor would this be at all surprising if we admit that the Angles came from that corner of Slesvig still called "Angeln," or indeed from any region n. of the Elbe. Some philologists, again, insist on distributing the Anglo-Saxon language into more dialects than two; but it will be sufficient if the reader bear in mind the two which have been mentioned. It is important to notice here that neither the Anglian nor the Saxon borrowed almost anything from the language of the conquered Britons; in other words, English is very nearly free of any Celtic element. On the other hand, a considerable, but not large, number of Latin words found their way into the English vocabulary before the Norman conquest, through the introduction of Latin Christianity, and the translation of Latin authors into English.

The period in the history of our English tongue incorrectly described as *Semi-Saxon* because the inflections that marked the earlier stage then began to give way, dates from a generation after the conquest until near the middle of the 13th century. Like every transition era, it was a period of confusion, both to those using the language, and to those desirous of tracing its history. The monks of the time, accustomed to the use of mediæval Latin, had in a great measure forgotten the grammar of their native language; and when they attempted to write it, did so very badly. The *Chronicle*, which in its latest form comes down to 1154, and Layamon's *Brut*, written about 1190 or 1200, exhibit traces of the breaking up of the grammar. The inflections and genders of the substantives, the definite and indefinite declensions of adjectives, are for the most part disregarded; a marked partiality is showed for weak preterits and participles; there is a constant substitution of *en* for *on* in the plurals of verbs; and the final *e* is often discarded; besides a great uncertainty prevailing in the government of prepositions. As regards the vocabulary itself, although employed in literature a century and a half after the Norman conquest, it exhibits, as already noticed, but few traces of Norman-French (only 90 words in 57,000 verses); proving beyond question that the immediate effects of that great change were by no means so important on the English tongue as they were at one time believed to be.

When we come to the *third* period in the history of English, commonly called *early English*, we have escaped most of the perplexities which attach themselves to the previous stage of our language. The tendency of the language to substitute an *analytical* for a *synthetical* structure is now seen vigorously at work. The "Anglo-Saxon" was tolerably rich in inflections, which are now largely got rid of. The various modifications of an idea are expressed by some relational word or words attached to the leading idea. During the second or semi-inflected period, the verbs suffered much less inflectional change than the substantives and adjectives; this will be found to hold throughout the entire 250 years of the era of reconstruction. In the fine poem of *The Owl and the Nightingale*, the Anglo-Saxon vowels *a*, *e*, *u*, in final syllables, are all represented by *e*, and the final *n* of the infinitive is beginning to disappear. In the chronicle of Robert of Gloucester we encounter, besides, a great number of French words (Dr. Marsh found 4 per cent in 10 pages), which had gradually become familiar to the people, through the presence of their Norman masters, and through the efforts of the latter to speak English after it was found impossible to supplant it by Norman French. The presence of French is, besides, very noticeable in the poetry of Chaucer and Gower; but there is no ground for the statement that these writers corrupted the language by a large admixture of novel French words. Dr. Morris is quite correct when he says (introduction to Chaucer's *Prologue*, etc., Clarendon press series), that Chaucer, "with few exceptions, employed only such terms as were in use in the *spoken* language, and stamped them

with the impress of his genius, so that they became current coin of the literary realm.* And Mr. Skeat remarks (introduction to *Piers the Plowman*, same series), that "Langland does the very same thing, employing Norman-French words freely whenever he wishes to do so." As to Scotland, again, in the Anglian counties lying south of the Forth, and as far north of it as English had got a footing, the language also underwent such changes as we have noted in the more southern dialects. Barbour, a Scottish contemporary of Chaucer, wrote purer English than Chaucer did, only because he used less French. Regarding the north-eastern dialects of Scotland, indeed, some diversity of opinion exists. Some antiquaries are of opinion that the large infusion of Norse or Scandinavian elements in these dialects is to be accounted for by the fact of a Norwegian kingdom having been maintained there more or less from the 9th to the 11th c.; while others allege that the language of the n.e. of Scotland is in substance and grammar as decidedly Anglian as that of Norfolk or Yorkshire.

We may here notice the question which has often been asked: Which of the early dialects spoken in England is the origin of the form now used? We have seen that in the pre-Norman period *two* were employed for literary purposes, a northern or Anglian, and a southern or Saxon, the latter of which, through political causes, was perhaps considered the more classical of the two. In the period, however, succeeding the Norman conquest, and more especially after 1250, we find not *two*, but *three* dialects; a northern, a midland, and a southern. The cause of this was probably the breaking up of the supremacy of Wessex after the battle of Hastings. Circumstances now gave prominence to the midland counties, in which arose the great universities, the rich monasteries, and many other religious foundations. One of its subdivisions, the east midland, was the dialect in which Ælfric, Robert of Brunne, Wicliffe, Gower, and, above all, Chaucer wrote. It had then become the speech of the metropolis, and had probably forced its way south of the Thames into Kent and Surrey. This, therefore, may be considered the immediate parent of modern English, but inasmuch as the midland gathered into itself from its very position many of the peculiarities of the dialects spoken north and south of it, sir Frederick Madden's view (*Layamon's Brut*, 1851), that we must look for the real groundwork of modern English in a gradual coalescence of the various dialects, may still be considered substantially correct. See Emerson, *History of the English Language* (1894).

ENGLISH LITERATURE, like every other mental product, is qualified by the history of the nation to which it belongs. The great social eras of a country's history have always been found to correspond with the great intellectual eras of her growth. It will, however, be sufficient for our purpose to arrange the literary annals of England into three periods: 1. The period antecedent to the Norman conquest; 2. The period extending from the Norman conquest to the English reformation; and 3. The period extending from the English reformation to the present day.

1. *The Period antecedent to the Conquest.*—This period possesses a literature composed in three distinct languages—the *Celtic*, the *Latin*, and the *English*. Regarding the Celtic literature, see **CELTIC NATIONS**, **IRISH LITERATURE**, and **WELSH LITERATURE**. The introduction of Latin literature into this country was considerably later than the Roman invasion of it. The cultivation of the letters of Rome followed as a necessary consequence on the introduction of Christianity into the country. Towards the close of the 6th c., St. Augustine landed in the south of England, and laid the foundations of the Anglo-Catholic church. These great evangelists, however, rather prepared the way for literary effort on the part of others, than were themselves literary. The earliest names that we encounter are Gildas, Nennius, Bede, Alcuin, Asser, and Erigena. After the immigration of the Angles and Saxons into Britain, this people began to form a literature of their own. Their three historical poems—*The Gleeman's Song*, *The Battle of Finnesburgh*, and *The Tale of Beowulf* (q.v.)—are mainly versions of events which happened on the continent before the descent on the shores of England. Except the remarkable religious poems of the Northumbrian monk Cædmon, in the 7th c., little more of any moment in verse has been handed down to us by the English people who lived before the conquest. But this people, though comparatively poor in poetry, are eminently simple and straightforward prose writers. King Alfred discarded Latin in all his communications with his subjects, and in consequence the native language made an impressive start throughout the whole of England. From the *Chronicle*, which is made up from the MS. of several conventual records, modern scholars have derived special and valuable information. Portions of the sacred Scriptures were translated into English, several of the leading men of the time, such as Ælfric, Bede, and Alfred, lending their assistance. Sermons and grammars, glossaries and medical treatises, geographies and dialogues between Solomon and Saturn, make up the file of this period of the literature.

2. *The Period extending from the Norman Conquest to the English Reformation.*—The conquest had the effect of changing the language of the court, the schools, and the tribunals of justice; it took but little effect on the native inhabitants. In a few centuries, owing partly to the obstinacy with which the English people clung to their mother-tongue, and partly to the circumstance that long settlement in England and political antagonism to France had practically changed the descendants of the Norman conquerors into English nobles, and inspired them with English feelings, the latter began to

abandon the use of French. "In 1349, boys ceased to learn their Latin through the medium of this tongue; and in 1362 (the 36th year of Edward III.), it was directed by act of parliament that all pleadings in the law-courts should henceforth be conducted in English, because, as is stated in the preamble to the act, French was become much unknown in the realm" (Morris's *Historical Outlines of English Accidence*, 1872). In a generation or two after the conquest, classical and theological learning made very considerable progress. Monasteries were busy, and the English universities were both by this time founded; while an interchange of teachers and pupils constantly went on between the English seminaries and those of France and other countries. Lanfranc and Anselm, Hales and Duns Scotus, Michael Scot and Roger Bacon, had attained to a great eminence in speculative and in physical philosophy. Doubtless their thinking was more characterized by its hair-splitting ingenuity than by its solidity, but the 12th and 13th centuries stand out in a distinguished manner in England, and indeed throughout Europe, for their peculiar devotion to speculative studies. But all these philosophers wrote in Latin, as did the historical writers of the same period, of whom the chief were William of Malmesbury, Geoffrey of Monmouth, Giraldus Cambrensis, and Matthew Paris. A literary feature of the age which must not be overlooked was the frequency of satire expressed in rhymed Latin verse. The most notable of the mediæval satirists was Walter Mapes, to whom is ascribed (though the evidence of his authorship is not conclusive) certain clever half-scurrilous poems, from one of which, the *Confessio Goliæ*, have been extracted a number of verses, commonly but erroneously spoken of as a "drinking-song" (see MAPES). The satire passed from the clergy, and was directed against the feeble king (John). De Montfort and the other great barons who distinguished themselves at Runnymede, are the theme of popular praise. In the same Latin tongue was composed the oldest legendary work of the middle ages. The *Gesta Romanorum* (q. v.) is a compilation of uncertain origin. The stories themselves are in many cases of great antiquity, and in their earliest forms can be traced to the distant east. In their Latin dress they were the property, not of England only, but of all western Christendom, and their only claim to notice in a special survey of E. L. arises from the fact that their editor, Elinandus, was perhaps an Englishman, and that they have furnished (at second or third hand) incidents and plots to the genius of Shakespeare and Scott. In the same relation to E. L. stands *The Seven Wise Masters*, traceable back to India, but known to all western Europe in a Latin form, and to England in particular under the title of the *Process of the Seven Sages*. The French Fabliaux affected our literature but little before the time of Chaucer. On the other hand, the romances of chivalry, rude and spirited, pathetic and imaginative, are well worth the attention of the student of English literature. The best of these, first written in French, but afterwards translated into English, celebrate the glory and fall of king Arthur and his knights of the Round Table, of which splendid use has recently been made by Alfred Tennyson in his *Idyls of the King*.

Meanwhile the English tongue was undergoing those serious grammatical and phonetic changes to which reference has already been made. During this half-chaotic stage it was scarcely fit to be a vehicle of literary expression, even if the ignorance and helplessness of the conquered people had not of themselves been sufficient to prevent the growth of a vernacular literature. The first indication of reviving life is the appearance of Layamon's *Brut* (see LAYAMON) about the close of the 12th century. The next century is comparatively rich in writers who use the English tongue, and whose works, if not masterpieces of artistic skill, are at least invaluable for linguistic purposes. The most important of these writers are Orm, Guildford, and Robert of Gloucester.

The period of what is called *Early English*, embracing the 14th and 15th centuries, is one of great importance, both in the progress of English history and of English literature. The translation (the first ever executed) of the Bible into English, which was completed by Wicliffe about 1380, is a work of great value, not only as a monument in the religious history of our nation, but in a philological point of view, being, as it is, all but first among the prose-writings in that form of the English tongue which is now in use. The principal book which precedes it, and the very oldest written in "early English," is sir John Mandeville's account of his eastern travels (1356). Somewhat later (between 1390 and 1400), Geoffrey Chaucer, the genuine father of English poetry, published his *Canterbury Tales*. A shrewd and sagacious observer, he has left behind him in these *Tales* a series of sportive and pathetic narratives, told with such a wonderful power of tenderness and humor, in such a simple, healthy style (although his vocabulary is largely modified by French, and is by no means a "well of English undefiled"), that they have been the wonder and delight of all succeeding times. Laurence Minot, Richard Rolle, Langland, author of *Piers the Plowman*, and Gower, fitly close round Chaucer as contemporaries who wrote more or less vigorous verse. About the same period flourished in Scotland John Barbour, whose epic narrative, *The Brus*, written about 1376, is incomparably the greatest of all the metrical chronicles. In the following century (the 15th), and in the early part of the 16th, occur in England the names of John Lydgate (1430), whose *London Lyckpeny* is still agreeable reading; Alexander Barclay, whose *Ship of Fools* was printed in 1509; John Skelton, author of the scurrilous satires of *Colin Clout* and *Why Come ye not to Court?* (died 1529); Howard, earl of Surrey (beheaded 1546-47), who wrote the first sonnets and the first blank verse in the English tongue; and sir Thomas Wyatt (died 1541). The prose writers of this period are sir John

Fortescue, chief-justice of the King's Bench under Henry VI., who flourished 1430-70, and who wrote, among other things, a tract on the *Difference between an Absolute and Limited Monarchy*, as it more particularly regards the *English Constitution*; William Caxton, who introduced printing into Britain in 1477—the first book ever printed in this country being a translation of the French work *Le Recueil des Histoires de Troye*; sir Thomas Malory, whose *Morte d'Arthur* (1469-70) is the final form of the Arthurian romance; Hall, an English lawyer (died 1547), who wrote a chronicle of the *Wars of the Roses*; and Tyndale, burned (1536) for heresy. In Scotland, during the same period, we encounter in poetry the names of James I., king of Scotland (murdered 1437), author of the *King's Quhair*, etc.; Andrew Wyntoun, prior of Lochleven, whose *Orygynale Cronykil of Scotland* was completed about 1420; Blind Harry, author of *The Adventures of William Wallace*, a work written about 1460, and long exceedingly popular with the Scottish peasantry; Robert Henryson (died circa 1500), author of *The Testament of Cresseid*, etc.; William Dunbar (died about 1520), whose *Dance of the Seven Deadly Sins* shows him to have possessed great boldness and vigor in his delineations of character; and Gavin Douglas (died 1522), whose best work is a translation of Virgil's *Æneid* into English verse—at least into what both Scotchmen and Englishmen then reckoned English verse.

3. *The Period extending from the English Reformation to the Present Day.*—Among the brilliant works of the Elizabethan age, there is probably none of which we may not detect germs in some of the efforts which were made in the century that preceded. In theology, the names of Latimer (burned 1555), of Cranmer (burned 1556), and of Ridley (burned 1555), shine forth conspicuously; and it is sufficient to mention sir Thomas More (beheaded 1535), author of *Utopia*, a curious philosophical work, and Roger Ascham (died 1568), as excellent miscellaneous writers of that time. The last-mentioned, indeed, exercised no inconsiderable influence on the development of the English tongue, and his *Scholemaster* is a work that is even yet influential. We may here mention the Scotchmen, Mair or Major, sir David Lyndsay, Boece, Melville, and, above all, George Buchanan, who is universally admitted to have been one of the finest classical scholars that ever appeared in Christendom.

The origin of the English drama is discussed in the articles *DRAMA* and *MYSTERIES AND MIRACLE PLAYS*. It is therefore only necessary here to note that the first English comedy, *Ralph Roister Doister*, was written by Nicholas Udall about 1552-53, and the first English tragedy, *Gorboduc*, or *Ferrex and Porrex*, by Sackville and Norton a few years later. The era on which we are next to look, the Elizabethan, is the most brilliant in the literary history of England. We may quote here the words of lord Jeffrey: "In point of real force and originality of genius, neither the age of Pericles, nor the age of Augustus, nor the times of Leo X. or of Louis XIV., can come at all into comparison. For in that short period we shall find the names of almost all the great men that this nation has ever produced; the names of Shakespeare, and Bacon, and Spenser, and Sidney; of Raleigh, and Hooker, and Taylor; of Napier, and Milton, and Cudworth, and Hobbes; and many others—men, all of them not merely of great talents and accomplishments, but of vast compass and reach of understanding, and of minds truly creative; not men who perfected art by the delicacy of their taste, or digested knowledge by the justness of their reasonings; but men who made vast and substantial additions to the materials upon which taste and reason must hereafter be employed, and who enlarged to an incredible and unparalleled extent both the stores and the resources of the human faculties." Even the minor dramatists of the time, such as Marlowe and Chapman, Beaumont and Fletcher, Jonson and Drummond, are all nearly the equals of any succeeding poets that have appeared. In the latter half of this period a new class of poetic writers started up, who were lyrical rather than dramatic, and whose occasional verses, sometimes descriptive, sometimes amatory, and sometimes religious, are characterized by a bright and delicate fancy, as if morning sunbeams glittered on their pages. These are George Wither, William Browne, Francis Quarles, and George Herbert, "the sweet psalmist of the 17th c." (as Emerson calls him). The last forty years of the 17th c. are generally known as the age of the restoration and the revolution. During this period, the literature of the stage was disgraced by its indecency. Charles II. and his court had brought back with them from France a love of polite profligacy, which found its most fitting expression in the comedy of intrigue. Four names stand out conspicuous as "sinners above all men in that generation"—Wycherly, Congreve, Vanbrugh, and Farquhar. Yet theology could boast of such names as Baxter, Owen, Calamy, Collier, Leighton, South, Tillotson, and Barrow. This was also the epoch when the great Milton, driven into the shades of obscurity by political adversities, fulfilled the uttered hope of his youth, and wrote "something which posterity will not willingly let die." About this time, too, Walton angled, and Butler burlesqued dissent; Marvell turned his keen irony against the high church; Locke and Newton speculated and discovered; and John Dryden, the literary chief of the time, "found the English language," according to Dr. Johnson, "of brick, and left it of marble."

The literary history of the 18th c., and of the reign of Queen Anne, has been variously estimated. "If it was overvalued," says Prof. Spalding, "by those who lived in it, and in the age that succeeded, it has assuredly been undervalued in our own day. It was long glorified as the Augustan age of English literature; but among ourselves it has been set aside as a skeptical, utilitarian age, when poetry could find no higher field

than didactic discussion, and prose found nothing to amuse but comic and domestic narrative, or bitter and stinging satire. The truth, as usual, lies in the middle. This age was far from being superior to every era that had gone before it, and it was not quite so low as some of its hostile critics have represented. One thing, however, is beyond dispute, viz., that the *form*, both in poetry and in prose, had come to be much more regarded than the *matter*. Addison, Swift, and Johnson may be taken as types of the prose writers of this century. The first, for ease and grace, is unmatched in any age; the second stands equally high for rough and pointed vigor; and the third is famous for his ponderous, finely balanced sentences, the dignity of which not unfrequently surpassed the sense. Defoe created no school, but the author of *Robinson Crusoe* will live for ever. The poetry of the time is represented by Pope, and it has been gravely asked whether he was a poet at all. He certainly versified with brilliant elegance, and the terror which his polished epigrams excited in the breasts of his enemies, showed him to possess a force of genius which at least demands our admiration. Young and Akenside were perhaps animated by a higher poetic sense, but they accomplished much less; and the same may also be said of Thomson, Gray, Collins, Beattie, and Cowper. Incomparably the greatest poet, however, of the 18th c. was Robert Burns, though he wrote in a dialect of English that has since become a *patois*, and even then, though used by a nation, was not the recognized standard of literary expression. Richardson, Fielding, Smollett, Sterne, Goldsmith, and Mackenzie are its novelists; Hume, Robertson, and Gibbon, its historians; Butler, Berkeley, Clarke, Shaftesbury, Hume, Paley, and Adam Smith its philosophers.

The first quarter of the nineteenth century belongs to the Georgian era of English literature, an epoch second only to the great Elizabethan era in brilliancy, and even superior to that in respect to the variety and range of its productiveness. The period was one of great and general unrest. Vast social, moral, economic, and political problems demanded solution. In France the ferment of the times had resulted in the terrible upheaval of the Revolution, and the Napoleonic wars which followed were involving all the nations of Europe. In England, as elsewhere, the minds of men were stirred to their depths concerning the vital questions of the hour, and their utterances in literature were characterized by vigor, earnestness, and simplicity. Two great schools of poetry originated almost simultaneously: one, the contemplative and ideal; the other, the romantic and sentimental. The latter developed rapidly and was predominant during the era, the former was of slower growth, and has much influenced the verse of our own time. The great reviews and magazines which came into existence early in the century had an important effect upon its literary progress. The *Edinburgh Review* (Whig) was founded in 1802 by Sydney Smith, Brougham, and Jeffrey, and the latter soon became its editor. Its severe criticisms of contemporary authors caused an immense sensation, and evoked Byron's sharp retort entitled *English Bards and Scotch Reviewers*. The *Quarterly Review* was established in 1809 as the organ of the Tory party, and the truculent Gifford was its first editor. Among its contributors were Southey, Scott, and Lamb. Somewhat later came *Blackwood's Magazine*, for which Wilson, as "Christopher North," wrote the celebrated *Noctes Ambrosianæ*, and Lockhart, his trenchant criticisms. There was also the *London Magazine*, to which Lamb contributed his delightful *Essays of Elia*, De Quincey, his *Confessions of an Opium Eater*, and Carlyle, articles on Schiller, and which numbered also among its writers Hazlitt, Leigh Hunt, and Cary. All these great periodicals exerted a powerful influence upon literature, especially in the development of the art of criticism, which has attained such importance now as to be almost an independent profession in the domain of letters. In this limited sketch it will only be possible briefly to characterize a few of the more illustrious authors of the period. Wordsworth, Coleridge, and Southey were all for a time residents of the Lake Country, and were more or less intimately associated; Coleridge and Southey had married sisters, and Wordsworth and Coleridge had published a volume of *Lyrical Ballads* to which each had contributed, but the nickname of "The Lake Poets," applied to them by an Edinburgh reviewer, was incorrect as implying that the three belonged to the same school of poetry. Wordsworth and Southey were quite different in their aims and methods, and as for Coleridge, the "inspired creator of splendid fragments," he was incapable of long pursuing any definite aim. Wordsworth, earnest, spiritual, philosophic, possessed of clear insight and lofty imagination, was the founder of the contemplative school of poetry. He was an intense egotist and delighted to record his own emotions as aroused by the phenomena of nature, or by intercourse with his fellow-men. To his receptive mind all objects and events were richly suggestive. His imagination was accustomed to exercise itself upon the simplest themes, and from them he derived material for profoundest thought. His poetry is, however, very unequal, and his longer productions contain much that is prosaic and uninteresting. Deficient in the sense of humor, he failed in some of his early poems to distinguish between the simple and unaffected and the trivial and commonplace, but his influence was most wholesome and valuable in directing men to a closer study of nature, and in showing them that the realm of poetry is far wider than they had supposed. Among his best works are the *Ode to Duty*, *Ode on Intimations of Immortality*, *Laodamia*, parts of the *Excursion*, and many of the sonnets and short lyrical poems. A discussion of Wordsworth's theories in regard to poetical composition would require too much space, but the reader will find them ably treated by several of the authorities referred to at the close of this article. The versatile and exuberant genius of Coleridge, as shown in his

wonderful gift of discourse, profoundly impressed his contemporaries. He has left but little poetry, but that is of the highest order, and of ideal beauty in form and spirit. The *Ancient Mariner*, *Christabel*, *Genevieve*, *Kubla Khan*, and *Youth and Age* are most sweet and melodious. The supernatural element in the *Ancient Mariner* and *Christabel* gives them a strange fascination, and the meter of the latter is charmingly diversified by counting only the four accented beats of each line, while the number of syllables varies from seven to twelve. As a critic he is remarkable for sympathy and insight. His *Aids to Reflection* are rich in suggestiveness, and the influence of his fertile thought has been deeply felt by the best minds of the century. Southey, poet laureate, was a fluent and copious writer of verse, which, notwithstanding its gorgeous coloring, does not rank very high as poetry. His description of his return to his home after a journey on the continent, contained in the Proem to his *Pilgrimage to Waterloo*, and some of his short poems, as *After Blenheim*, are charming. Among his prose works are the quaint and curious *Doctor* and an admirable *Life of Nelson*. Scott is the great exemplar of the romantic school. His first original work of importance, *The Lay of the Last Minstrel*, is a romance of Border Life in the 16th century. It met with instantaneous success, and *Marmion* and *The Lady of the Lake* were received with ever-increasing delight. His later poems were less popular, for a new luminary, Byron, had appeared, of sufficient brilliancy to eclipse even Scott. The latter then turned his attention to prose, and with the long series of *Waverley Novels*, in which his vivid narrative and descriptive powers had full scope, the genial "Wizard of the North" won a still more enduring fame than that which he had gained as a poet. Byron, like Scott, is clear, fluent, and vigorous, but far more fervid and impassioned. He had no dramatic gift. His chief power lay in description. The public have always been disposed to identify the poet himself with his morbid and cynical heroes. But Moore gives a much more attractive picture of the character of his friend, and Byron has avowed that his typical hero, the melancholy and misanthropic *Childe Harold*, was modelled after Dr. Moore's *Zeluco*. Byron's undoubted genius is not fully evident in the first two cantos of *Childe Harold's Pilgrimage*, and the sudden fame which followed their publication has puzzled the critics. Prof. Minto plausibly suggests that the instantaneous and rapturous applause that greeted these cantos was largely due to the opportune moment at which they appeared, when the public mind was regarding with the most intense interest the localities described: Spain, which was then the seat of the war with Napoleon, and Greece, the description of whose fallen glories touched the hearts that were at that time trembling for the future of England. Among Byron's best works are the third and fourth cantos of *Childe Harold's Pilgrimage* and the fine sonnet *On the Castle of Chillon*. Moore, sparkling and humorous, was one of the most popular and successful authors of his day, but his posthumous is not equal to his contemporary fame. He wrote many graceful and tender songs for Irish national melodies. *Lalla Rookh*, his longest work, consists of a brief prose romance which forms the framework of four Oriental poems. His *Life of Byron* is a trustworthy and creditable biography. Campbell's reputation rests mainly on his spirited lyrical poems, *Hohenlinden*, *The Battle of the Baltic*, *Lord Ullin's Daughter*, and others. Crabbe had in the previous century produced some realistic pictures of peasant life, and after an interval of twenty-two years resumed his pen with greater skill in *The Parish Register*. Of Shelley, Dowden says, "No other poet has pursued with such breathless speed on such aerial heights the spirit of ideal beauty." Swinburne, who is an ardent admirer of Landor, places him midway between Shelley and Byron, as far below Shelley as he is above Byron. *Prometheus Unbound* is the masterpiece of Shelley's longer works; *The Cenci* is a powerful tragedy. The *Ode to the West Wind*, *To a Skylark*, and *The Cloud* are exquisite lyrics. The early death of Keats cut short a career of unusual promise. His genius is akin to that of Shelley, and his beautiful poems, the *Ode to a Nightingale*, the *Ode to Autumn*, and that *On a Grecian Urn*, had he written nothing else, would have assured the immortality which he hopefully but modestly anticipated in writing to his brother, "I think I shall be among the English poets after my death." Leigh Hunt (the chief of the "Cockney" school of poets, as they were satirically dubbed by the *Edin. Rev.*), although not free from certain foibles and affectations, wrote both verse and prose of high merit. Among his chief works are the narrative poem, *The Story of Rimini*, and an excellent play called *A Legend of Florence*. His best-known poem is the little apologue *Abou Ben Adhem*. His critical works, *Imagination and Fancy*, and *Wit and Humor* evince his admirable taste and his alertness in discerning minute felicities. Among the lesser poets of this era are H. K. White, Jas. Montgomery, R. Bloomfield, the Scotch poets, J. Grahame, A. Cunningham and W. Tennant, J. Wolcot ("Peter Pindar"), the satirist, Mrs. Barbauld, whose exquisite little apostrophe to *Life* is sufficient to keep her memory green, C. Wolfe, whose fame is also dependent on a single fine poem, *The Burial of Sir John Moore*, Joseph Blanco White, author of *The Sonnet to Night*, one of the most beautiful in the English language, Mrs. Hemans, Mrs. Opie, John Clare, S. Rogers, the genial banker-poet, the brothers J. and H. Smith, who wrote the witty *Rejected Addresses*, Mrs. Tighe, F. Mahony ("Father Prout"), Praed, and Bp. Heber, whose hymns are familiar to all. Charles Lamb, the delightful essayist, has a quaint and somewhat antique style derived from his fondness for certain writers of a bygone age. His playful fancy, his delicate humor, and his sweet and lovable disposition endear him to all. His reputation chiefly rests on the *Essays of Elia*, but he has written a few graceful poems, as *Hester*, *Savory* and *The Old Familiar Faces*.

Before the appearance of Scott's *Waverley*, Maria Edgeworth, in *Castle Rackrent* and other tales, pictured Irish life and character with attractive and minute fidelity. A little later Jane Austen, in *Pride and Prejudice*, *Emma*, and *Persuasion*, and Susan Ferrier, in *Marriage and The Inheritance*, pictured with similar fidelity provincial life in England, and life in the Scotch Highlands, and with a charm which has not yet lost its potency. Other celebrated romances of the time are: Mrs. Radcliffe's *Mysteries of Udolpho*, Godwin's *Caleb Williams*, Matthew Gregory Lewis's *Monk*, Mary Shelley's *Frankenstein*, Jane Porter's *Scottish Chiefs* and *Thaddeus of Warsaw*, Lady Morgan's *Wild Irish Girl*, Beckford's *Vathek*, Croly's *Salathiel*, and Peacock's *Headlong Hall* and other curious tales. John Galt's Scotch and Gerald Griffin's Irish stories are of this period also. Among the dramatists are G. Colman, Jr., and Joanna Baillie, whose much-admired *Plays on the Passions* are now forgotten. Holcroft's *Road to Ruin*, Knowles's *Virginus*, *The Hunchback*, and *The Wife*, and Tobin's *Honeymoon* are still occasionally seen upon the stage.

The Scottish school of philosophy founded by Reid was represented by Dugald Stewart, Dr. Thos. Brown, and Sir James Mackintosh, the latter of whom ably opposed the utilitarian theory of Bentham and of his distinguished follower, James Mill.

In accuracy, in vividness of portrayal, and in the philosophic interpretation of the relationship of events, the historians of the 19th century have made so marked an advance as to supersede all of the older historians except Gibbon. The historians of the Georgian era are the calm and judicious Hallam, author of a *View of the State of Europe during the Middle Ages*, a *Constitutional Hist. of Eng.*, and an *Introd. to the Literature of Europe in the 15th, 16th, and 17th Centuries*; John Lingard, author of a well-written and honest *Hist. of Eng.* as seen from a Roman Catholic point of view; James Mill, who wrote a severe but impartial *Hist. of India*; Sir James Mackintosh, whose *Vindiciae Gallicæ* was the ablest argument against Burke's denouncement of the French Revolution (though he was afterwards led by the excesses of that bloody period to modify his opinions), and whose unfinished *Hist. of the Eng. Rev. of 1688* is a brilliant and valuable fragment; Sharon Turner, author of a *Hist. of the Anglo-Saxons*, and *Hist. of Eng. in the Middle Ages*; and Henry Hart Milman, whose principal work is his able *Hist. of Latin Christianity*. Sir H. Davy and Whewell are the most prominent writers on science, and Hall, Chalmers, and Irving on theological topics.

The poetry of the Victorian era is mainly lyrical. Its principal characteristics are intellectuality, refinement, and exquisite finish. The best representative of this school is Tennyson. "In technical excellence, as an artist in verse," says Stedman, "Tennyson is the greatest of modern poets." In *Memoriam*, the noble elegy in memory of A. H. Hallam, and the *Idylls of the King*, especially *Morte d'Arthur* and *Guinevere*, are his masterpieces. Landor ranks high as a poet, and is even more distinguished as a prose writer. *Count Julian* is a noble tragedy, and the *Hellenics*, translations made in his old age of his own Latin poems written many years before, are among the most beautiful of the shorter poems. His *Imaginary Conversations*, particularly the *Citation of Shakespeare*, the *Pentameron*, and *Pericles and Aspasia*, are marvelous productions of genius and learning. Hood's prominent characteristics are humor and pathos. He is an inveterate punster. Among his most notable poems are *The Bridge of Sighs*, *The Song of the Shirt*, *The Dream of Eugene Aram*, and the satire, *Miss Kilmansegg*. Procter ("Barry Cornwall") is chiefly distinguished for a great variety of charming songs and lyrics. Browning, like Tennyson, is profoundly intellectual, but far more impassioned. With him art and finish are decidedly subordinate. His thoughts crowd one upon another, and his sentences frequently become so involved and intricate as to be obscure. His insight into the workings of the human mind is wonderful. *The Ring and the Book* is perhaps his greatest work. The prelude briefly narrates the story on which the poem is founded (the trial of an Italian for wife-murder), and tells that it was found in an old book picked up by chance at a book-stall. This story, as given by the chief witnesses at the trial, as commented on by "half Rome" and by "the other half Rome," as discussed by the opposing lawyers, as told by the defendant, and as summed up by the Pope, is repeated in detail in each of the ten principal divisions of the poem, and yet the interest of the reader is held to the end. It is a wonderful achievement. But Browning's inequality of performance is shown in this masterpiece, in which occur certain passages of mere affectation and clap-trap, such as no poet of lesser reputation would dare to publish. The spirited poems *How they Brought the Good News from Ghent to Aix*, *The Lost Leader*, *Hervé Riel*, and the *Pied Piper of Hamelin* are general favorites. In the *Dramatic Romances and Lyrics*, *Men and Women*, and *Dramatic Idylls* are gathered the best of his shorter poems. Mrs. Browning ranks as the foremost among women poets. Intellectual, impassioned, sometimes obscure and wanting in finish, she has merits and faults similar to those of her distinguished husband. All her writings breathe a firm and abiding trust in God, and a tender and sympathizing love for humanity. Among her chief works are *Aurora Leigh*, a narrative poem in nine books, into which, she says, her "highest convictions upon life and art have entered," but which is not, on the whole, her most successful production; *A Drama of Exile*, the subject of which is the expulsion of Adam and Eve from Eden; the noble *Vision of Poets*; and the lovely, so-called, *Sonnets from the Portuguese*, which are, in fact, a record of her own heart-experience. She felt an ardent interest in the enfranchisement of Italy, and some of her strongest and most impassioned poems, as *Casa Guidi Windows* and *Mother and Poet*, have reference to the struggle of that country for nationality. Mrs. Browning

had a thorough acquaintance with the Greek language and literature, and translated the *Prometheus Bound* of Æschylus and various other Greek, and some Latin and German poems. Matthew Arnold is a poet of much refinement, and is still more eminent as an essayist and critic. *Sohrab and Rustum*, *Balder Dead*, *The Scholar-Gipsy*, and the beautiful elegy, *Thyrsis*, are some of his best productions. Robert Buchanan as poet is a true interpreter of Nature. He is also a sympathetic and candid critic. Among his finest poems may be mentioned *The Scairth o' Bartle*, *The Ballad of Judas Iscariot*, and *Lights of Leith*. He has written some excellent dramas also. D. G. Rossetti, quaint in diction and ornate in style, has composed many exquisite sonnets and dramatic lyrics, and has made admirable translations from the early Italian poets. *The Blessed Damozel* is one of his best-known poems. Wm. Morris, a most facile and melodious poet, is a follower of Chaucer. His *Earthly Paradise* is modeled after the *Canterbury Tales*. In the prelude to each section he faithfully paints Nature in her various moods throughout the year, and the twenty-four tales of the voyagers are most skilfully narrated. In *Life and Death of Jason*, *Sigurd*, and *House of the Wolfings* he maintains nearly the same high level as in the *Earthly Paradise*, showing a wonderful ease and grace whether in verse or prose. A. C. Swinburne, a most accomplished linguist and scholar, has employed various new metres, and has developed hitherto unknown capabilities of the English language in rhythm and melody. *Atalanta in Calydon* represents perfectly the form and spirit of the old Greek drama. *Chastelard*, *Bothwell*, and *Mary Stuart*, written at different periods of the poet's career, compose a grand dramatic trilogy. Of several fine elegies, the most beautiful is *Ave atque Vale*, in memory of Baudelaire. As a critic Swinburne exhibits at times a rare insight, but his opinions are occasionally biased by a friendly partiality. Austin Dobson and Andrew Lang are charming writers of society verse, and their dainty reproductions of French metres have found many imitators. Other poets of the period are Palgrave, Clough, Monckton Milnes, Aytoun, Th. Martin, Macaulay, Bailey, A. Smith, Massey, Dobell, Patmore, Adelaide Procter, Jean Ingelow, Christina Rossetti, A. M. F. Robinson, Mrs. C. F. Alexander, "Owen Meredith" (Lord Lytton), C. Kingsley, Thackeray, Edwin Arnold, Lewis Morris, Jas. Thomson, E. Gosse, Locker, and Calverley. Miss Mitford will be better remembered for her fresh and pleasing sketches of *Our Village* than for her more ambitious dramas. Milman, Talfourd, Bulwer, C. Kingsley, R. H. Horne, Sir H. Taylor, Tennyson, Westland Marston, H. C. Merivale, W. G. Wills, and W. S. Gilbert have also written dramas, some of which, however, although of much literary merit, are better adapted for reading than for stage representation, Faber, Newman, Trench, Alford, Bonar, Chr. Wordsworth, Mrs. S. F. Adams, and Charlotte Elliott have increased the treasures of hymnology by original contributions, and Neale, Caswall, Miss Winkworth, and others, by excellent translations. Pattison, Symonds, E. Gosse, T. Watts, Caine, Dowden, Shairp, Sharp, Craik, Saintsbury, and Minto are cultivated and discerning critics, and several of them are graceful poets also.

The principal novelists and romancers of the period are Dickens, Thackeray, and "George Eliot" (Mrs. Cross). The genial humor of Dickens rendered him extremely popular. His characters are chiefly taken from the lower ranks of life, but are nevertheless unreal, as he is apt to make some one trait unduly prominent. *David Copperfield* and *A Tale of Two Cities* are among his best works. Thackeray is a satirist who never allows us to forget the foibles and vices of human nature, although he gives some beautiful illustrations of noble character. The personages that he depicts are mainly from the upper classes of society. *Henry Esmond*, *Vanity Fair*, and *The Newcomes* are his masterpieces. "George Eliot," with her original and powerful intellect, her learning, her remarkable skill in psychological analysis, and her keen sense of humor, undoubtedly stands first among the many women who have been successful in fiction. *Adam Bede* and *Romola* are the most famous of her works. The brilliant genius of the Brontë sisters won for them a hearty tribute of applause, and Charlotte Brontë, with *Jane Eyre*, *Shirley*, and *Villette*, fascinated a host of readers. Mrs. Gaskell, the biographer of Charlotte, was a delightful novelist herself, as *Mary Barton*, *Cranford*, and *Wives and Daughters* evince. Mrs. Craik's *John Halifax* is a charming story, and doubtless the favorite among her many books. Miss Yonge, Miss Amelia B. Edwards, Miss Ingelow, Mrs. Oliphant, Mrs. Anne Thackeray Ritchie, and "Lucas Malet" (Mrs. Harrison, daughter of Chas. Kingsley) have also won distinction as novelists, and several of them in other departments also. Disraeli wrote political novels; Bulwer, novels of society chiefly. Trollope has cleverly sketched various phases of clerical life. Charles Kingsley's versatile genius is displayed in *Hypatia*, *Westward Ho*, and the *Water-Babies*. Charles Reade is a vigorous writer with very decided mannerisms. His earlier novels, especially *The Cloister and the Hearth*, are his best. R. L. Stevenson has written romances, sketches of travel, and poems, in all of which the charm of style is exquisite. Other prominent novelists and romancers are Hardy, Blackmore, Black, Besant, McCarthy, Meredith, MacDonald, Mrs. Humphry Ward, Caine, Barrie, Kipling, Doyle, Du Maurier, Crockett, John Maclaren Watson, and Anthony Hope Hawkins.

The brilliant and dogmatic Macaulay has been of great service in popularizing the study of history. Formerly somewhat overestimated, he is now in danger of being undervalued. Carlyle is of all historians the most vivid and graphic. His style is unique, rapid, and full of allusions. As an essayist he is most inspiring and stimulating. Froude's literary skill is admirable in history, biography, and essays, but his great *Hist. of Eng. from the Fall of Wolsey to the Death of Elizabeth* is marred by undue par-

tiality for Henry VIII. His record of the reign of Elizabeth is valuable. Kinglake's *Hist. of the Crimean War*, though too long, is of great interest, but it also is affected by the prejudices of the author. Freeman's *Norman Conquest* is an able and trustworthy account of this early period of English history. J. R. Green's *Hist. of the Eng. People* is compendious, well proportioned, and reliable. Bryce's *American Commonwealth* is admirable for lucidity, accuracy, and candor. Stanley's *Hist. of the Jewish Church, Sinai and Palestine*, and *Hist. of Westminster Abbey* are delightful and valuable works. Buckle and Lecky have written notable books on the philosophy of history. Other important historical works are Arnold's *Hist. of Rome*; Merivale's *Hist. of the Romans under the Empire*, which forms a link between the histories of Arnold and Gibbon; Grote's *Hist. of Greece*; Bp. Thirlwall's *Hist. of Greece*; Rawlinson's *Hist. of Egypt*, and his various other histories of Oriental monarchies; Sir F. Palgrave's *Hist. of Normandy and England*; the *Hist. of the Peninsular War*, and *Hist. of the Conquest of Scinde*, by Sir W. F. P. Napier, the most distinguished military historian of England; Sir T. E. May's *Const. Hist. of Eng. since the Accession of Geo. III.*, which serves as a continuation of Hallam's *Const. Hist.*; Bp. Stubbs's *Const. Hist. of Eng.*; Justin McCarthy's *Hist. of Our Own Times* and *Hist. of the Four Georges*; and Goldwin Smith's *England and America, Civil War in America*, and *Irish History and Irish Character*. Ruskin, eloquent and dogmatic, and Hamerton, genial and stimulating, are prominent writers on art. Sir Wm. Hamilton is the leader of the Scotch school of metaphysics, and J. S. Mill, Lewes, and Spencer are representatives of the English materialistic school. Bain is an able exponent of the utilitarian view of ethics. J. S. Mill, Fawcett, Jevons, Thorold Rogers, and Harriet Martineau have written on political economy. Brewster, Faraday, Mary Somerville, Sir J. Herschel, R. Owen, Hugh Miller, Darwin, Tyndall, Huxley, Mivart, R. A. Proctor, W. K. Clifford, P. G. Tait, and Lubbock are distinguished in science, and several of them have written with marked force and beauty of style. Prominent philologists and writers on the English language are Max Müller, Isaac Taylor, Trench, Alford, Moon, F. Hall, T. L. K. Oliphant, and W. W. Skeat. Whateley, Lightfoot, Pusey, Conybeare, Howson, Ellicott, Alford, Trench, Robertson, Farrar, Liddon, Mozley, Stopford Brooke, Kingsley, Maurice, Martineau, Hanna, Tulloch, J. Caird, Spurgeon, Newman Hall, Drummond, F. B. Meyer, Faber, Newman, Manning, and Wiseman are eminent religious writers of various denominations. Want of space forbids the mention of other authors of note who have contributed to the departments of literature above mentioned, and it is also impossible to speak of many writers whose works cannot be included in those departments.

The following books are recommended for consultation: Wright, *Bibliographia Britannica Literaria*, 1. Anglo-Saxon Per.; 2. Anglo-Norman Per. T. Warton, *Hist. Eng. Poetry*. *Eng. Lit. Hist.*, 3 vols.: I., S. A. Brooke, *Eng. Poetry to Accession of King Alfred*; II., G. Saintsbury, *Elizabethan Era*; III., E. Gosse, *18th Century*. Chambers's *Cyc. of Eng. Lit.* Taine, *Hist. Eng. Lit.*, tr. by Van Laun. Bernhard ten Brink, *Hist. Eng. Lit.*, 2 vols.: I., *Early Lit. to Wiclif*, tr. by H. M. Kennedy; II., pt. 1, *Wiclif, Chaucer, Earliest Drama, Renaissance*, tr. by W. C. Robinson; Katharine Lee Bates, *The English Religious Drama*; Mrs. Oliphant, *Lit. Hist. of Eng., xviii.-xix. Centuries*; W. Minto, *Lit. of the Georgian Era*; E. C. Stedman, *Victorian Poets*; Bascom, *Philos. of Eng. Lit.*; G. L. Craik, *Compendious Hist. of Eng. Lit.*; A. W. Ward, *Hist. Eng. Dram. Lit.*; J. P. Collier, *Hist. Eng. Dram. Poetry*; T. H. Ward, *The English Poets*; H. Morley, *Lit. in the Reign of Victoria*; B. Tuckerman, *Hist. Eng. Prose Fiction*; J. Morley (ed.), *Eng. Men of Letters*; M. Arnold, *Essays in Criticism*; Dowden, *Studies in Lit.*; Swinburne, *Essays and Studies*; Frederick Ryland, *Chron. Outlines of Eng. Lit.*

ENGLISH PALE, or **IRISH PALE**, or **THE PALE**, a portion of Ireland brought under English rule before the complete subjugation of the whole island, corresponding nearly with the present province of Leinster, with the counties of Cork, Kerry, Waterford, Limerick, and Tipperary; but the boundaries varied at different times.

ENGRAFTING. See **GRAFTING**.

ENGRAILED, in heraldry, a line composed of a series of little half-moons, or semi-circles, supposed to have been made in it by hail. **E.** is the opposite of **invected**.

ENGRAVING, in its widest sense, is the art of incising designs, writing, etc., on any hard substance, such as stone, metal, or wood. Many branches of the art are of great antiquity; such as gem-engraving, cameo-cutting, and die-sinking. The more important of these ornamental and useful kinds of **E.** are described under their proper heads. But in a narrower sense, **E.** is the special designation of the art of cutting or indenting the surface of metal plates or of blocks of wood with designs, for the purpose of taking off impressions or *prints* of the designs on paper. This department of the art arose as late as the 15th c., the earliest wood-engraving with a date being 1423, and the earliest dated **E.** from a metal plate being 1461.

Wood-engraving differs from **E.** on metal in this, that on a metal plate the traces or marks which are to appear on the paper are cut or sunk into the plate, and when printed from are filled with ink, while the rest of the surface is kept clean; whereas in wood-engraving they are left prominent or in relief, and the blank parts of the design are cut away. Hence a wood-cut acts as a *type*, and is inked and printed from in the usual way. See **PRINTING**. This makes wood-engraving peculiarly suitable for the illustration of

books; as the blocks can be printed from along with the letterpress; while the impressions from a metal plate must be taken by themselves, and by a slow process. The further treatment of the important art of wood-engraving is reserved for a separate article; our attention at present being confined to E. on metal.

It is beyond our scope to enter into the practical details of the various processes; we can only aim at enabling a reader altogether ignorant of them to conceive how the effects may be produced, and to understand the terms currently used in speaking of this kind of art.

The metals most commonly used for E. are copper and steel, the former having the advantage of being more easily worked, the latter of greater durability. The processes of working are essentially the same in both. The several manners or styles of E. are distinguished as line-engraving, mezzotinto, stippling, and aquatinta.

1. *Line-engraving*—in which, as the name implies, the effect is produced by a combination of lines—is executed either by direct incision with the graver or the dry-point, or by a combination of incision with *etching*—a chemical process to be immediately described. The *graver* or *burin* is usually in the form of a quadrangular prism, fitted into a short handle. In making the incision, the graver is pushed forward in the direction of the line required, being held by the handle, at an angle very slightly inclined to the plane of the copper. A *scraper* is required to scrape off the barb or burr which is formed by the action of the graver and dry-point. The *rubber* is a roll of cloth dipped in oil, and is used to make the surface smooth. A *burnisher* is required to polish the plate, and erases any scratches which it may accidentally receive, and also to make lighter any part of the work which may have been made too dark. The *dry-point* is like a sewing-needle fixed into a handle, and is used to cut or scratch the finer lines. The graver cuts the copper clean out, the dry-point throws it up on each side; and in some cases this is not scraped off, but made use of till it is worn off, as it gives richness to the line.

In etching, the first step is to cover the plate with a composition of wax, asphaltum, gum-mastic, resin, etc., dissolved by heat; an outline of the design, made on paper in pencil or red chalk, is then “transferred” to the surface of this composition, by being passed through a press. The subject is then drawn on the ground with the etching-point, which cuts through it, and exposes the copper. *Etching-points* or *needles* resemble large sewing-needles shortened, and fixed into handles 4 or 5 in. long; some are made oval, to produce broader lines. A rim of wax being put round the plate, acid is poured on, and corrodes the copper not protected by the ground. If the acid is found not to have acted sufficiently, it may be applied again to the whole design, or only to portions of it, by *stopping up*, with a mixture of lampblack and Venice turpentine applied with a camel-hair pencil, what been sufficiently *bitten in*.

When a series of parallel lines are wanted, as in backgrounds, etc., an ingenious machine called a ruler is employed, the accuracy of whose operation is exceedingly perfect. This is made to act on etching-ground by a point or diamond connected with the apparatus, and the tracings are bit in with aquafortis in the ordinary way.

2. The process of *mezzotinto* is by no means so difficult as line-engraving. The plate is prepared by being indented or hacked all over by an instrument with a serrated edge, called a cradle, which is rocked to and fro upon it in all directions. The barb or nap thus produced retains the printer's ink, and if printed, a uniform dark surface would be the result. On this plate, after a tracing has been transferred, the engraver goes to work with tools called scrapers and burnishers—those parts of the ground most smoothed being the highest lights, and the ground the least operated on producing the deepest shadows. As the work proceeds, it may be blackened with ink, applied with a printer's ball or otherwise, in order to ascertain the effect. The design is sometimes etched on the plate by the ordinary process, before the mezzotinto ground is laid.

3. *Aquatint Engraving*.—By this method, the effect of drawings in Indian ink is produced; and at one time it was greatly made use of in rendering the drawings of Paul Sandby and our early water-color painters, and particularly prints for drawing-books. In this process, which is a very complex kind of etching, the ground, which is composed of pulverized rosin and spirits of wine, assumes when dry a granulated form; and the aquafortis acting on the metal between the particles, reduces the surface to a state that an impression from it resembles a tint or wash of color on paper. David Allan engraved his celebrated illustrations of the *Gentle Shepherd* in this manner. It has now gone almost entirely out of use, having, like E. in imitations of drawings in chalk or pencil, been in a great degree superseded by lithography.

4. In E. in *stipple*, which was much in vogue in the end of the last century, the drawing and effect are produced by small dots, in place of lines. Ryland, Bartolozzi, and Sherwin, excelled in this style. It is well suited for portraits; several of Raeburn's have been capitally engraved in stipple by Walker. It involves much more labor than mezzotint, and is now little practiced.

Plate-printing.—Copper-plates, engraved in any of the above styles, are ready for press as soon as they are finished by the engraver. The method of printing from them is very simple. Their engraved surface is daubed over with a thick oleaginous ink, so that the lines are effectually filled. As this dirties the whole face of the plate, it is necessary to clean it, which is done by the workman wiping it first with a piece of cloth,

and then with the palms of his hands, rubbed on fine whiting. It may be calculated that a hundred times more ink is thus removed than actually remains in the indentations; however, such is necessary. The plate being thoroughly cleaned, it is laid on a press, with a piece of damped paper over it; and being wound beneath a roller covered with blanket stuff, it is forced to yield an impression on the paper. The plate requires to be kept at a moderate warmth during the operation. The frequent rubbing of the plate with the hand to clean it, as may be supposed, tends greatly to wear it down; and such is the wear chiefly from this cause, that few copper-plates will yield more than a few thousands of impressions in good order. The earliest, called *proofs*, are always the best and most highly prized.

In consequence of this defect in copper, the practice of *engraving steel-plates*, for all subjects requiring a great many impressions, has now become very common. This process was introduced by the late Mr. Perkins of London, who originally softened the plates, engraved them, and then rehardened them—a practice now abandoned, as ordinary steel-plates can be worked upon by the burin, dry-point, scraper, and burnisher with perfect facility. Etching on steel-plates is executed much in the same way as in the process on copper. An E. on a steel-plate may be transferred in relief to a softened steel cylinder by pressure; and this cylinder, after being hardened, may again transfer the design by rolling it upon a fresh steel-plate; and thus the design may be multiplied at pleasure.

History of Engraving.—This most important invention, by which the productions of art are diffused without limit, is said to have been accidental, and is claimed for Tommaso Finiguerra, who first took impressions on paper about the year 1440. His employment was executing ornamental E., chiefly on articles used in religious services, such as small portable shrines, or altar-pieces. These were generally made of silver, and the designs engraved on them were filled up with a black composition, that hardened in a short time. This composition was called in Italian *niello* (from Lat. *nigellus*, dim. of *niger*, black), and the workers in it *niellatori*. It was the practice of Finiguerra, in the course of executing his work, to prove it by rubbing lampblack and oil into, and pressing paper over it; he thus obtained an impression of his work up to a particular stage, and was enabled safely to carry it on till it was completed. Finiguerra's title to the invention has been disputed; and in a recent work by J. D. Passavant, *Le Peintre-Graveur* (Leip. 1860), a strong case seems to be made out for its German origin. Be that as it may, the principal early Italian engravers who followed Finiguerra, were Bacio Baldini (born about 1436, died 1515); Sandro Botticelli (born 1437, died 1515)—he embellished an edition of Dante's *Inferno*, brought out in 1481; Antonio Pollajuoli (born 1426, died 1498, at Florence); Andrea Mantegna (born at Padua 1431, died at Mantua 1505); and Marc Antonio Raymondi (born at Bologna 1487 or 1488, died 1539), who executed his chief works at Rome. The most celebrated early German engravers were Martin Schoengauer (born at Colmar about 1455, died 1499); Israel van Meckeln, or Meckenen (born at Meckenen on the Meuse about 1450, and died 1523); Michel Wohlgemuth, who died in 1519; Albert Dürer (born at Nürnberg in 1471, died in 1528); and Lucas van Leyden (born at Leyden 1494, died 1533). The engravings of all these artists are very valuable, not only from their scarceness, and as illustrating the early history and progress of the art, but as exemplifying many high qualities that have never been surpassed in later times. The most of them were painters, and engraved their own works, except Marc Antonio, who engraved chiefly those of Raphael, by whom he was employed, and who occasionally overlooked and directed him. All those engravers, and their immediate followers, executed their works with the graver; but soon after, engravings came to be generally executed by two processes—etching, and cutting with the graver or the dry-point. The works of these early masters are often remarkable for character and expression, as those, for instance, by Mantegna; and for the correctness and high style of the drawing, for which qualities Marc Antonio has never been surpassed; also for finish of the most careful and elaborate kind, which has been carried further by Albert Dürer and Lucas van Leyden than by any other engravers. The styles of these early engravers were cultivated by numerous successors, several of whom followed their masters as closely as they could, while others diverged into something like originality: the chief names are Agostino Veneziano, about 1620; Nicolas Belin da Modena, and Giov. Ghisi, 1630; Luc. Damesz, who died in 1533; Giov. Giac. Caraglio, and Marco da Ravenna, about 1640; Giul. Bonasone, born at Bologna in 1498, died in Rome in 1564; Eneus Vicus, George Vens, Henrid Aldegraf, and Jean Sebast. Böhm, about 1550; Adrian, Charles, William, and John Collert, Adam and George Ghisi, Suter mann, Virgilius Solis, Cornelius Cort, Martin Rota, and others, ranging from the middle to the end of the 16th century. Agost. Caracci, the celebrated painter, executed many spirited engravings. Saenredam, De Bruyn, Galle, Kellerthaller, Alberti, De Goudt, C. de Pass, Sadeler, are names of well-known engravers that enter on the 17th century. Henry Goltzius is noted for the number and variety of his works, and his imitations of the styles of the older masters. In the plates of engravers towards the middle of the 17th, and beginning of the 18th c., a large proportion of the work consists of etching, the graver being chiefly used for deepening and clearing up the etching. This arose from the manner of working being well adapted for rendering the style of the painters of that period, whose works were distinguished for freedom of execution or touch, and clear-

ness and transparency. The most noted engravers of this period were the Vischers, who flourished between 1610 and 1650, and engraved many of Berghem's pictures; Bolswert, 1620; Lucas Vosterman the elder, 1630; Suyderhoef, about 1640. These engravers rendered many of the works of Rubens in a very spirited manner. Coryn Boel—whose engravings from Teniers are in some respects superior even to La Bas—Troyen, and Van Kessel, are worthy contemporaries.

In the age of Louis XIV., a race of engravers of portraits arose, who carried execution with the graver almost to perfection. The works of the artists they engraved from were florid in style, with a great display of drapery and lace, and accessories in the backgrounds elaborately executed. Among these engravers the following rank highest: Gerard Edelinck (b. Antwerp 1627, d. Paris 1707)—he was one of the best engravers of the period, and specially patronized by Louis XIV.; Masson (b. 1636, d. 1700); Larmessin (b. 1640, d. 1684); Drevet the elder (b. 1664, d. 1739); Drevet the younger (b. 1697); Gerard Andran (b. 1640, d. 1703). There was a large family of Andrans engravers, but Gerard was the most celebrated, indeed, he was one of the best of the French engravers. Among engravers of talent in England may be mentioned Robert Walker (b. 1572); William Faithorne (b. London between 1620 and 1630, d. 1694) executed many excellent engravings of portraits; George Vertue (b. London 1684, d. 1756), a good engraver, and a man of general information and taste in matters of art; John Smith (b. London 1654, d. 1732) executed in mezzotinto a vast number of interesting portraits. In the 18th c., there were numerous excellent engravers, by whose works the taste for the pictures of the Dutch school of the 17th c. has been widely extended. Two of the most distinguished of these were John Philip le Bas (b. Paris 1708, d. 1782) and John George Wille (b. Königsberg 1717, d. 1808). Their styles are totally dissimilar. Le Bas's plates are chiefly etched, and remarkable for spirit and sharpness of touch and transparency; accordingly, mostly all his works are after painters who excelled in these qualities, particularly Teniers. Wille's engravings, again, are of the most careful and elaborate description, and his best prints are after Gerard Dow, Terburg, Mieris, and Metz—masters distinguished for the high finish of their pictures. He worked with the graver; and his plates are distinguished by the precision and clearness with which the lines are cut. See Henri Bérault's *Engravers of the 18th Century*.

It was about the middle and latter portion of last century that engraving reached its highest point in England. The works of William Hogarth (b. London 1698, d. 1764) are of world-wide celebrity, but that is owing mainly to the excellence and dramatic interest of the pictures from which the engravings are made, though, no doubt, his prints are engraved in a firm clear style, similar to that practiced by the French engravers of the time, several of whom were employed by him. It was sir Robert Strange (b. Orkney 1721, d. London 1792), an engraver of figures, and William Woollet (b. Maidstone 1735, d. London 1785), a landscape-engraver, who imparted to English E. those qualities and characteristics that enable us to claim a style of E. that is national, differing from other styles, and that has arisen and been best carried out in this country. In drawing and form, Strange was rather defective; but he excelled in what engravers call color, or the art of producing, by means of variety of line, a texture or quality that compensates for the want of color, by giving to the E. something of the richness produced by color in a picture. His imitation of the softness and semi-transparency of flesh was particularly successful, and superior to that of the French engravers, whose works, though in most respects admirable, failed in that respect, and had, in the more delicate parts, a hard or metallic look. Woollet treated landscape-engraving in a manner totally new, imparting to it more firmness and decision, by making great use of the graver. His works have more finish and force than former landscape-engravers, but they are in some degree liable to the objection of hardness, in the treatment of foliage in particular. The works of these two engravers have had a marked influence on art, not only in this country, but abroad. The merit of Strange's style was acknowledged on the continent; he was elected a member of the academies of Florence, Bologna, Parma, and Rome. At the end of last century, art had fallen very low on the continent, but a regeneration was beginning; and in Italy, engravers were then arising, such as Volpato and Cunego, who studied and imitated the softness and, technically speaking, fleshiness of texture that distinguished the works of the British engraver; those, again, were followed by Raphael Morghen, Longhi, Mercurii, and others, in Italy; by Boucher Desnoyers, Forster, etc., in France; and by Müller, Keller, Gruner, and numerous other engravers in Germany. By them, engraving has been carried to the highest pitch. Amongst their works, the following are *chefs-d'œuvres*: "The Last Supper," after Da Vinci, by R. Morghen; the "Sposalizia," after Raphael, by Longhi; "La Belle Jardinière," and other works, after Raphael, by Boucher Desnoyers, who has engraved the works of Raphael perhaps on the whole better than any other engraver; "The Madonna de San Sisto," by Müller, and "The Dispute on the Sacrament," after Raphael, of Keller. No engravings executed in this country come up to the works of these last-named masters, who have engraved works of a higher class than the majority of those done by Strange, while the drawing and general treatment of their works are in a purer and more correct style. However, the engravings of Burnet, Raimbach, Stewart, and others after Wilkie and contemporary British painters, deservedly held the highest place among works of the class to which they belong, and betoken clearly the great influ-

ence which Strange exercised on their style. At present, few figure-subjects are executed in the line-manner, and that art has certainly fallen in this country. This may be accounted for, perhaps, by the great use made of mechanical appliances, in portions of the work, to save time, and by the preference shown for mezzotinto-engraving as practiced at present, that is, with a mixture of lining or stippling. The greater number of Landseer's works have been engraved in that way, and it is now adopted for rendering the works of John Phillip and Millais, and the leading artists of the day. Several, however, of Landseer's earlier works have been engraved in the line-manner, particularly his pictures of "Drovers Leaving the Grampians," and "The Watering-place," by Watt, which are capital examples of line-engraving. There is no good modern school of landscape-engraving on the continent; the influence of Woollet was entirely confined to this country, where landscape-engraving, particularly in illustrated works after Turner, has attained great excellence.

Towards the end of last century, mezzotint engraving was practiced in England with great success; arising from its being peculiarly adapted to render effectively the works of sir Joshua Reynolds. M'Ardell, Earlom, Watson, Smith, Valentine Green, and Ward were among the best engravers of his works. The invention of this process is generally given to prince Rupert, others ascribe it to Dr. Wren, 1662, and state that prince Rupert merely improved on the invention. It has been practiced very generally from the time of its invention, but attained its highest position in sir Joshua's time; and it is very successfully carried out now, in an altered manner, additional force being aimed at, by means of stippling and etching. It is well calculated for producing broad effects: Turner's *Liber Studiorum*, and the landscapes after Constable, are admirable examples of its capabilities in this way; the effect in Turner's plates, however, is heightened by etching.

The nineteenth century has produced some of the most thoroughly artistic work in line engraving, both in figure and in landscape. Its characteristics, in comparison with the work of other centuries, are chiefly a more thorough and delicate rendering of local colors, light and shade, and texture. The older engravers could draw as correctly as the modern; but they either neglected these elements or admitted them sparingly, as opposed to the spirit of their art. If you look at a modern engraving from Landseer, you will see the blackness of a gentleman's boot (local color), the soft roughness of his coat (texture), and the exact value in light and dark of his face and costume against the cloudy sky. Nay, more, you will find every sparkle on bit, boot, and stirrup. Modern painting pays more attention to texture and *chiaroscuro* than classical painting did, so engraving has followed in the same directions; but there is a certain sameness in pure line engraving which is more favorable to some forms and textures than to others. This sameness of line engraving, and its costliness, have led to the adoption of mixed methods, which are extremely prevalent in modern commercial prints from popular artists. In the well-known prints from Rosa Bonheur, for example, by T. Landseer, H. T. Ryall, and C. G. Lewis, the tone of the sky is produced by machine-ruling, and so is much under tone in the landscape; the fur of the animals is all etched, and so are the foreground plants, the real burin work being used sparingly where most favorable to texture. Even in the exquisite engravings after Turner, by Cooke, Goodall, Wallis, Miller, Wilmore, and others, who reached a degree of delicacy in light and shade far surpassing the work of the old masters, the engravers have recourse to etching, finishing with the burin and dry-point. Turner's name may be added to those of Raphael, Rubens, and Claude in the list of painters who have had a special influence upon engraving. The specialty of Turner's influence was in the direction of delicacy of tone. In this respect the Turner vignettes to Rogers' poems were a high-water mark of human attainment, not likely to be surpassed.

Pure line engraving is still practiced by a few artists in England and France. In France, the lovers of line engraving have endeavored to keep it alive by organizing themselves into a society for its encouragement. The most recent direction of the art, in the works of Ferdinand Gaillard, is a return to studied outline, but in combination with the most elaborate modeling. In his "St. Sebastian" the outline is studied and marked with careful firmness throughout, and the modeling is thoroughly worked out in minute touches and fine lines, giving powerful relief without any but the most delicate *chiaroscuro*.

To prepare a plate for etching, it is first covered with etching-ground, a composition which resists acid. A ground is to be of a quality so adhesive that it will not quit the copper when a small quantity is left isolated between the lines, yet not so adhesive that the etching point cannot easily and entirely remove it; at the same time a good ground will be hard enough to bear the hand upon it, or a sheet of paper, yet not so hard as to be brittle. The plate being grounded, its back and edges are protected from the acid by Japan varnish, which soon dries; then the drawing is traced upon it. The best way of tracing a drawing is to use sheet gelatine, which is employed as follows: The gelatine is laid upon the drawing, which its transparency allows you to see perfectly, and you trace the lines by scratching the smooth surface with a sharp point. You then fill these scratches with fine black-lead in powder, rubbing it in with the finger; turn the tracing with its face to the plate, and rub the back of it with a burnisher. The black-lead from the scratches adheres to the etching-ground, and shows upon it as pale gray,

much more visible than anything else which you can use for tracing. Then comes the work of the etching-needle, which is merely a piece of steel sharpened more or less. Turner used a prong of an old steel fork, which did as well as anything; but neater etching-needles are sold by artists' color-makers. The needle removes the acid and lays the copper bare. Some artists sharpen their needles so as to present a cutting edge, which, when used sideways, scrapes away a broad line; and many etchers use needles of various degrees of sharpness to get thicker or thinner lines. It may be well to observe, in connection with this part of the subject, that while thick lines agree perfectly well with the nature of wood-cut, they are very apt to give an unpleasant heaviness to plate engraving of all kinds, whilst thin lines have generally a clear and agreeable appearance in plate engraving. Nevertheless, lines of moderate thickness are used effectively in etching when covered with fine shading, and very thick lines indeed were employed with good results by Turner when he intended to cover them with mezzotint and to print in brown ink, because their thickness was essential to prevent them from being overwhelmed by the mezzotint, and the brown ink made them print less heavily than the black. Etchers differ in opinion as to whether the needle ought to scratch the copper or simply to glide upon its surface. A gliding needle is much more free, and therefore communicates a greater appearance of freedom to the etching; but it has the inconvenience that the etching-ground may not always be entirely removed, and then the lines may be defective from insufficient biting. A scratch needle, on the other hand, is free from this serious inconvenience; but it must not scratch irregularly so as to engrave lines of various depth. The biting in former times was generally done with a mixture of nitrous acid and water, in equal proportions; but in the present day a Dutch mordant is much used, which is composed as follows: Hydrochloric acid, 100 grammes; chlorate of potash, 20 grammes; water, 880 grammes. To make it, heat the water, add the chlorate of potash, wait until it is entirely dissolved, then add the acid. The nitrous mordant acts rapidly, and causes ebullition; the Dutch mordant acts slowly, and causes no ebullition. The nitrous mordant widens the lines; the Dutch mordant bites in depth, and does not widen the lines to any perceptible degree. The time required for both depends upon temperature. A mordant bites slowly when cold, and more and more rapidly when heated. To obviate irregularity caused by difference of temperature, a good plan is to heat the Dutch mordant artificially to 95° F. by lamps under the bath, for which a photographer's porcelain tray is most convenient, and to keep it steadily to that temperature; the result may be counted upon; but whatever the temperature fixed upon, the result will be regular if the temperature be regular. To get different degrees of biting on the same plate, the lines which are to be pale are "stopped out" by being painted over with Japan varnish, or with etching-ground dissolved in oil of lavender, the darkest lines being reserved to the last, as they have to bite longest. When the acid has done its work properly, the lines are bitten in such various degrees of depth that they will print with the degree of blackness required; but if some parts of the subject require to be made paler, they can be lowered by rubbing them with charcoal and olive oil, and if they have to be made deeper, they can be re-bitten or covered with added shading. Re-biting is done with the roller above mentioned, which is now charged very lightly with paste, and rolled over the copper with no pressure but its own weight, so as to cover the smooth surface, but not to fill up any of the lines. The oil of lavender is then expelled as before by gently heating the plate, but it is not smoked. The lines which require re-biting may now be re-bitten, and the others preserved against the action of the acid by stopping out. These are a few of the most essential technical points in etching, but there are many matters of detail for which the reader is referred to the special works on the subject. During the last twenty years there has been a great revival of etching as an independent art. The comparative rapidity of the process, and the ease with which it imitates the manner of painters, have caused it to be now very generally preferred to line engraving by publishers for the transcription of all pictures except those belonging to a severe and classical style of art. See Hamerton's *The Etcher's Handbook* (London, 1871), and *Etching and Etchers* (London, 1876); Bishop's *The Etcher's Guide* (Phila., 1879); Lalanne's *A Treatise on Etching* (Boston, 1885).

Aquatint may be effectively used in combination with line-etching, and still more harmoniously with soft-ground etching in which the line imitates that of the lead pencil. Of all kinds of engraving, mezzotint comes nearest to nature, though it is far from being the best as a means of artistic expression. Copper, steel, and zinc are the metals chiefly used in engraving. The use of copper is largely increased of late, as the copper is now coated with steel by electrotype process, which enables it to resist printing almost indefinitely, and the steel can be removed at pleasure. Zinc is similarly coated with copper, and is sometimes used for small editions. See WOOD ENGRAVING.

Etching has been already described as a part of the process of E.; but as practiced by painters, it is classed as a distinct art. The plate is prepared with a ground, and corroded in the same way; but the treatment is more free. Not being tied to the task of literally copying or translating the idea of another, like the engraver, the painter has scope to impart a spirit to his work peculiarly suggestive of what he intends to embody; his idea is represented directly, and not at second-hand, as it were. The etchings of Rembrandt, Paul Potter, Karl du Jardin, Adrian Vandevelde, Teniers, Ostade, Berg-

hem, Backhuysen, Van Dyck, Claude, Salvator Rosa, Canaletti, and other painters, are very highly valued, as conveying more completely the feeling of the painter than the best engravings. Etching was more practiced by the old than by modern painters; yet Wilkie, Landseer, and other modern artists, have etched various plates, remarkable for character and spirit.

English works on E.—*Sculpture, or the History and Art of Chalcography and Engraving on Copper*, by John Evelyn (Lond. 12mo, 1663; 8vo, 1755); *The Art of Engraving and Etching, with the Way of Printing Copper-plates*, by M. Faithorne (Lond. 1702); *Sculptura Historico-technica, or the History and Art of Engraving, extracted from Baldinucci Florent, Le Compt, Faithorne, the Abecadario Pittorico, and other authors* (Lond. 4to, 1747, 1766, and 1770); *An Essay upon Prints*, by Gilpin (Lond. 8vo, 1767, 1768, and 1781); Strutt's *Biographical Dictionary of Engravers* (2 vols., 4to, Lond. 1785); Landseer's *Lectures on Engraving* (8vo, Lond. 1806); *An Inquiry into the Origin and Early History of Engraving upon Copper and on Wood*, by Otley (1816); Hamerton's *Graphic Arts* (1882).

Of late years, many inventions have been introduced, having for their object to supersede the slow and laborious manual operations of E. by means of machinery and other appliances. It is, however, to business and ornamental purposes that they are chiefly applicable, and not to the production of artistic work of the kind treated of in this article. The subject will be noticed under MACHINE-ENGRAVING, MEDAL, GLASS, etc. With regard to the reproduction of plates, and other applications of galvanic electricity to E., see GALVANISM AND MAGNETO-ELECTRICITY. See also PHOTOGRAPHY AND PHOTOGRAPHIC PROCESSES.

ENGRAVINGS, PROPERTY IN. The copyright law adopted by the United States in 1891 includes in the list of articles to which the right of copyright may attach, engravings, cuts, prints, photographs and negatives thereof, as well as books, maps, and the like. Proprietorship, therefore, in any engraving may be retained by the process of depositing before publication with the Librarian of Congress a copy of the title of the engraving with a description thereof and delivering to the same person after publication two copies of the work. As in other cases, the copyright runs for twenty-eight years, and it may be renewed by the artist or his widow or children for a further term of fourteen years. Engravings judged to be immoral or obscene are not entitled to copyright privilege. In England a comparatively recent statute defines the acts relating to copyright in engraving to include lithographs or the products of any mechanical process by which prints or impressions of drawings or designs are capable of being multiplied indefinitely; and this definition has been held to include photographs. See COPYRIGHT.

ENGROSSING A DEED. See INGROSSING.

ENGROSSING AND REGRATING. An engrosser, regrater, or forestaller, is a person who buys grain, flesh, fish, or other articles of food, with the intention of selling them again at an enhanced price, either in the same fair or market, or in another in the neighborhood, or who purchases or contracts for corn while still in the field. These practices were regarded as criminal in most countries, before the laws by which trade is regulated were properly understood. In England, they were forbidden by various statutes, from the time of Edward VI. to that of queen Anne. These statutes were repealed by 12 Geo. III. c. 71, on the preamble, that it hath been found by experience, that the restraints laid upon the dealing in corn, meal, flour, cattle, and sundry other sorts of victuals, by preventing a free trade in the said commodities, have a tendency to discourage the growth, and to enhance the price of the same. It was found, however, that engrossing was not only a statutory but a common law offense, and a prosecution for it in the latter character actually took place in the present century. The act 7 and 8 Vict. c. 24, for abolishing the offenses of forestalling, regrating, and engrossing, was consequently passed. Besides declaring that the several offenses of badgering, engrossing, forestalling, and regrating be utterly taken away and abolished, and that no information or prosecution shall lie either at common law or by virtue of any statute, either in England, Scotland, or Ireland, this statute repeals a whole host of earlier enactments in restraint of trade, which had been omitted in the statute in the time of George III., above referred to. The rubrics of these enactments give a curious picture not only of the trading errors, but in many other respects of the obsolete customs of our ancestors. The first, for example (51 Henry III.), is called a "statute of the pillory and tumbrel, and of the assize of bread and ale." Then there is an act passed in several reigns which provides for the punishment of "a butcher or cook that buyeth flesh of Jews, and selleth the same to Christians."

Notwithstanding the doctrine of the Scottish law, that statutes may be repealed by mere desuetude, it was thought safer to include the Scottish statutes to the same effect. The earliest is 1503, c. 38, and the latest 1661, c. 280.

The statute 6 and 7 Vict. c. 24, does not apply to the spreading of false rumors, with the intent to enhance or decry the price of merchandise, or preventing goods from being brought to market by force or threats, which continue to be punishable as if that act had not been made.

ENGUE'RA, a t. of Spain, in the province of Valencia, 35 m. s.w. of the town of that name. It is poorly built, and has narrow and irregular streets. It has manufactures of linen and woolen goods, and some trade in cattle and agricultural produce. Pop. '87, 6256.

ENGUICHÉ. A hunting-horn, the rim around the mouth of which is of a different color from the horn itself, is said heraldically to be enguiché, of the color in question.

ENHARMONIC, a term applied in music when the name of a note is changed without any sensible difference of sound, such as C \sharp and D \flat , F \sharp and G \flat . Correctly speaking, there is, or ought to be, a difference; but on keyed instruments, such as the organ and pianoforte, there can be none, as the same key serves for both sharp and flat, while with a just equal temperament the ear is in no way offended. In harmony, the principal seat of enharmonic change is in the chord of the diminished seventh, which, by a change of the notes, may be treated fundamentally in four different ways, without any sensible difference in the intonation.

ENKHUI'SEN, a fortified t. and seaport of the Netherlands, in the province of North Holland, is situated on the western shore of the Zuider Zee, about 30 m. n.e. of Amsterdam. It is built with great regularity, and is of a circular form. The most important public building is an elegant town-house, with a lofty tower. In the sixteenth and seventeenth centuries it was a very important commercial centre with a large population, of whom many were engaged in the herring fisheries. The chief industries are ship and boat-building, rope-spinning, sail-making, refining salt, brewing, etc. There is an export trade in butter, cheese, corn, timber, cattle, and fish. Several vessels are engaged in the herring-fishing. Pop. '89, 5,780.

ENLIGHTENED DOCTOR. See LULLY, RAYMOND.

ENLISTMENT IN THE ARMY is superintended by the recruiting service, the chief of which is stationed in New York. The recruiting service is both general and special—general when performed by officers selected and detached for such duty, and special when it concerns departments and regiments, or particular military organizations. The adjutant-general details the field officers to superintend the service and command the recruiting depots, and announces in orders the number of the company officers to be furnished for it by each regiment.

Applicants for enlistment must be between the ages of eighteen and thirty-five years, unmarried, of good character and habits, able-bodied, and free from disease. No applicants are enlisted who cannot intelligibly converse in English and fully understand orders and instructions given in that language.

Applicants are required to satisfy the recruiting officer regarding age and character, and should be prepared to furnish the necessary evidence. *A minor can be enlisted only with the written consent of his parents or a legally appointed guardian, and when his physical development is exceptionally good and presents many characteristics of maturity.*

For infantry and artillery the height must be not less than five feet four inches, and weight not less than one hundred and twenty-eight (128) pounds, and not more than one hundred and ninety (190) pounds.

For cavalry the height must not be less than five feet four inches, and not more than five feet ten inches, and weight not to exceed one hundred and sixty-five (165) pounds. The maximum age for cavalry recruits upon original enlistment is fixed at thirty years.

The term of service is five years. Under the law a soldier in his first enlistment, after having served one year, can purchase his discharge for \$120, with a reduction of \$5 in the purchase price for every subsequent month until he completes three years' service, when, if he has served honestly and faithfully, he is entitled to a furlough for three months, with the privilege of discharge at the expiration of the furlough. All soldiers, in addition to their pay, receive rations, clothing, bedding, medicines and medical attendance.

The following is the rate of pay as now established :

| GRADE. | Pay per Month. |
|---|----------------|
| Hospital Steward..... | \$45 |
| Acting Hospital Steward..... | 25 |
| Sergeants of Post Non-commissioned Staff..... | 34 |
| Sergeant Major—Cavalry, Artillery, and Infantry..... | 23 |
| Regimental Quartermaster Sergeant—Cavalry, Artillery, and Infantry..... | 23 |
| Principal Musician—Artillery and Infantry..... | 22 |
| Chief Trumpeter of Cavalry..... | 22 |
| Saddler Sergeant—Cavalry..... | 22 |
| First Sergeant of a Company—Cavalry, Artillery, and Infantry..... | 22 |
| Sergeants—Cavalry, Artillery, and Infantry..... | 17 |
| Corporals—Cavalry, Artillery, and Infantry..... | 15 |
| Farriers and Blacksmiths—Cavalry..... | 15 |
| Saddlers—Cavalry..... | 15 |
| Field Musicians—Cavalry, Artillery, and Infantry..... | 13 |
| Privates—Cavalry, Artillery, Infantry, and Hospital Corps..... | 13 |

From the first year's pay \$4 per month is retained, which, together with \$1 per month for the third year of enlistment, \$2 per month for the fourth year, and \$3 per month for

the fifth year, in addition to the rates above enumerated, will be paid to the soldier upon discharge, provided he has served honestly and faithfully. The sums thus retained will be treated as deposits, upon which interest, at the rate of four per cent. per annum, will be paid from the end of the year of the soldier's enlistment in which they have accrued.

The soldier can deposit his savings in sums not less than \$5 with any army paymaster, and for any sums not less than \$5 so deposited for the period of six months or longer, the soldier, on his final discharge, will be paid interest at the rate of four per cent. per annum. These deposits are non-forfeitable except for desertion.

For soldiers who have become infirm during 20 years' service, or who have been discharged for wounds received or sickness brought on in service, a comfortable home is maintained in the city of Washington. Twelve and a half cents per month is deducted from the soldiers' pay to be applied toward the support of the home. After 30 years' service enlisted men are entitled to retire upon three-fourths of the monthly pay in the grade they held when retired, with commutation for allowances of clothing and subsistence.

ENLISTMENTS IN THE NAVY are made at naval rendezvous, on board receiving ships, and on board cruising vessels, and are usually for a term of three years. Enlistments for duty on board receiving ships, coast survey vessels, fish commission vessels, at the Naval Academy, and other naval stations are for special service for the term of one year. Enlistments on board vessels in foreign waters are for the cruise of the vessel only, and no person can be enlisted in the naval service unless the commanding and medical officers both pronounce favorably as to his fitness. No person under the age of fourteen, no insane nor intoxicated person, no person known to have committed an infamous crime, and no deserter from the naval or military service of the United States can be elected. Minors cannot be enlisted without the consent of their parents or guardians. The shipping articles are read to every person about enlisting, in order that he may clearly understand what he is doing. General service men can only be enlisted in the following ratings: Seamen, ordinary seamen, landsmen, machinists, boilermakers, first-class firemen, second-class firemen, coalheavers, and such petty officers as are entitled to be enlisted in their ratings from having received three consecutive good conduct badges, or holding a seaman gunner's certificate. The master-at-arms, ship's and engineer's yeomen, will be enlisted as landsmen and rated. Bandsmen, officers' stewards, cooks, and attendants are enlisted for the cruise only.

ENLISTMENT DURING THE CIVIL WAR. The following is a complete list of the various "calls" for troops by the United States government during the civil war:

| Date of Call. | Number of Men. | Term of Service. | Number Obtained. |
|---------------------|----------------|-------------------|------------------|
| April 15, 1861..... | 75,000 | 3 months | 91,816 |
| May 3, 1861..... | 500,000 | 6 mo.-1-2-3 years | 700,080 |
| July 2, 1862..... | 300,000 | 3 years | 421,465 |
| Aug. 4, 1862..... | 300,000 | 9 months | 87,588 |
| Oct. 17, 1863..... | 300,000 | 3 years | 317,092 |
| Feb. 1, 1864..... | 200,000 | 3 years } | |
| Mar. 14, 1864..... | 200,000 | 3 years | 259,515 |
| July 18, 1864..... | 500,000 | 1-2-3-4 years | 385,163 |
| Dec. 19, 1864..... | 300,000 | 1-2-3-4 years | 211,752 |

There were other calls for 30 and 100 days' men. The aggregate quota called for was 2,763,670; total obtained, 2,678,967. By act of congress Mar. 3, 1863, called the "conscription act," the president was authorized to draft troops. The act provided for an enrollment, a draft, the reception of substitutes, and arrest of deserters. About 3,000,000 men between the ages of 20 and 45 were enrolled. The calls from Oct. 17, 1863, were orders for drafts. But probably not more than 50,000 drafted men performed personal service. Substitutes were obtained. "The substitute fund" of the government, consisting of money paid in as a release from service, and which was used as a "bounty fund" for volunteers, amounted to \$25,902,029.

ENMANCHÉ, or EMANCHÉ. See MANCHE.

ENNEAN'DRIA, is the ninth class of plants in the Linnæan system, so called because the flowers have nine stamens. It is a small class, and the Linnæan classification being now generally superseded, the term is not often used.

ENNEMOSER, JOSEPH, known as a medico-philosophic writer, was b. 15th Nov., 1787, at Hintersee, in the Tyrol, and commenced his academic studies at Innsbruck in 1806. On the rising of the Tyrolese against the French in 1809, E. followed Andreas Hofer as his secretary, and honorably distinguished himself in battle on several occasions. At the close of the war, he went to Erlangen, and subsequently to Vienna, for the purpose of concluding his studies. Here, however, he experienced the greatest difficulty in procuring the means of subsistence, but fortunately fell in with a merchant from Altona, in whose company he traveled for some time. When Napoleon declared war against Russia in 1812, E. was despatched to England, to solicit aid for the Tyrolese in their meditated insurrection against the French domination. He was afterwards appointed by Friedrich Wilhelm III., king of Prussia, an officer in a regiment of volunteers, and soon gathered about him a company of Tyrolese marksmen, who were

of great service during the campaigns of 1813 and 1814. After the peace of Paris, E. went to Berlin, where he finished his curriculum, and in 1816, took his degree of doctor of medicine. In 1819, he was made professor of medicine at the new university of Bonn, where he lectured on anthropology, physical therapeutics, and pathology. A love of his native country induced him to settle as a physician in Innsbruck, but in 1841 he went to Munich, where he obtained a great reputation by the application of magnetism as a curative power. Among his writings may be mentioned, *Der Magnetismus in seiner geschichtlichen Entwicklung* (Leip. 1819), which is reckoned his principal work; *Historisch-psychologische Untersuchungen über den Ursprung und das Wesen der Menschlichen Seele* (Bonn, 1824); *Anthropologische Ansichten zur bessern Kenntniss des Menschen* (Bonn, 1828); *Der Magnetismus im Verhältniss zur Natur und Religion* (Stuttg. 1842); *Der Geist des Menschen in der Natur* (Stuttg. 1849); *Was ist die Cholera* (2d edit., Stuttg. 1850); and *Anleitung zur Mesmer'schen Praxis* (Stuttg. 1852). He died in 1854.

ENNIS, a municipal borough, chief t. of co. Clare, Ireland, on the Fergus, 20 m. w.n.w. of Limerick, is a neat town, with some good houses. Pop. '91, 6500. Till 1885 it returned one member to parliament. It has a Roman Catholic college, a Roman Catholic cathedral, the ruins of a monastery founded in 1240 by O'Brien, prince of Thomond. Near the town is Ennis college, founded by Erasmus Smith. E. has a valuable limestone quarry, large flour mills, and some trade in grain.

ENNISCORTHY, a market t. in the middle of Wexford co., Ireland, on a rising ground on the Slaney, 14 m. n.n.w. of Wexford. The Slaney is here tidal and navigable for barges, and flows through a fertile and beautiful valley. Pop. '91, 5,648.

ENNISKILLEN, a municipal and till 1885 a parliamentary borough, chief town of co. Fermanagh, Ireland, about 75 m. w.s.w. of Belfast, is beautifully situated on the Erne; the greater portion on an isle in the river between the upper and lower loughs Erne. It consists mainly of one undulating street running e. and w. Around are richly cultivated eminences and many fine mansions. It has various manufactories including tanneries, cutlery works, and straw hat works and markets for butter, pork, and flax. Pop. '91, 5,570. E. received its first charter in 1613. It is famous for the victory, in 1689, of the troops of William III., under lord Hamilton, over a superior force of James II., under lord Galmoy.

ENNIVS, QUINTUS, an early Roman poet, the father of the Roman Epos, was b. at Rudia, in Calabria, about 240 years before the Christian era, and was probably of Greek extraction. He is said to have served in the wars, and to have risen to the rank of a centurion. In Sardinia, he became acquainted with Cato the elder, and returned with him to Rome, when about the age of 38. Here he gained for himself the friendship of the most eminent men, among others that of Scipio Africanus the elder, and attained (what was then exceedingly rare in the case of an alien) to the rank of a Roman citizen. He supported himself in a decent but humble manner by instructing some young Romans of distinguished families in the Greek language and literature, his accurate knowledge of which explains the influence he had on the development of the Latin tongue. He died when he had attained the age of 70, or about 169 B.C. His remains were interred in the tomb of the Scipios, and his bust was placed among those of that great family. E. has tried his powers in almost every species of poetry, and although his language and versification are rough and unpolished, these defects are fully compensated by the energy of his expressions, and the fire of his poetry. His poems were highly esteemed by Cicero, Horace, and Virgil: the last, indeed, frequently introduces whole lines from the poetry of E. into his own compositions. His memory seems to have been lovingly cherished by his countrymen; *Noster Ennius*, "Our Ennius," they used to call him. Of his tragedies, comedies, satires, and particularly of his *Annales*, an epos in 18 books, only fragments are still extant. What adds to our regret is, that it is believed his whole works were extant as late as the 13th c. (A. G. Cramer, *Hauschronick*). The fragments have been collected and edited by various scholars, among others by Hessel (Amst. 1707). The fragments of the *Annales* have been edited by J. Vahlen (Berlin, 1886). Compare Hoch, *De Ennianorum Annalium Fragmentis* (Bonn, 1839). The few fragments of his dramas that have come down to us were collected by Ribbeck in his *Scenica Romanorum Poesis Fragmenta* (2 vols. 1871-73).

ENNS, a river of Austria, rises at the northern base of a branch of the Noric Alps in the crownland of Salzburg, 12 m. s. of Radstadt. It first flows n. to Radstadt, then n.e. to Hieflau, after which it proceeds in a general direction n.n.w., passes Steyer, and joins the Danube 11 m. below the town of Linz, after a course of about 120 miles. Its chief affluents are the Salza and the Steyer. For the last 15 m. of its course, the E. forms the boundary between Upper Austria (Ober der Enns) and Lower Austria (Unter der Enns). The scenery on the banks of the E. is in general bold and romantic, as it flows, for the most part, between parallel mountain-chains, which are lofty and precipitous. In its lower course, it becomes navigable, but it is chiefly important from the valuable water-power which it supplies.

ENNS, or ENS, a t. in Austria, on the river Enns, near its junction with the Danube; pop. '90, 4,674. It has iron and steel manufactures. It stands on the site of a Roman station, Lauriacum, where in 304 Galerius inflicted a cruel persecution upon the Chris-

tians. The walls of the town were built with the ransom money paid for Richard I. of England.

ENNUI (Fr. *ennuyer*, to annoy). The English equivalent of this expression, as nearly as it can be rendered, is "listlessness," "dullness." It denotes a wearied state of mind due to the want of an object of interest, or to enforced attention to something devoid of interest; the state of being bored. In common parlance, it denotes a listlessness found among ultra-fashionable people caused by an excess of pleasure.

ENOCH, the name of two different individuals in Scripture.—1. The eldest son of Cain, who built a city which was called after his name.—2. The son of Jared, and father of Methuselah. A peculiarly mysterious interest attaches to him on account of the supernatural manner in which his earthly career terminated. We are told by the writer of Genesis, that E. "walked with God 300 years . . . and he was not; for God took him." What the statement "he was not" signified to the later Jews, is explained by the writer of the Epistle to the Hebrews: "Enoch was translated that he should not see death." E. and Elijah are the only human beings on record who did not require to discharge the debt which mortals owe to nature. It may naturally be supposed that E. was a character on whom the extravagant fancy of the later Jews would fasten with unusual pleasure. As they came more and more into contact with Grecian and other culture, they felt the necessity of linking on the arts and sciences of Gentile nations to their own history, if they would continue to preserve that feeling of supremacy which was so dear to their pride as the chosen people. Hence, E. appears as the inventor of writing, arithmetic, astronomy, etc., and is affirmed to have filled 300 books with the revelations which he received, the number 300 being obviously suggested by the number of years during which he is said to have walked with God.

ENOCH, Book of. This book, from which, curiously enough, St. Jude quotes as if it were history, shows how richly mythical the history of the mysterious antediluvian E. had become! It was probably written originally in Aramaic, by a native of Palestine, in the 2d. c. B.C. The precise date is not known. At subsequent periods, it would seem to have been enlarged by additions and interpolations. It is divided into five parts; and the *first* discourses of such subjects as the fall of the angels, and the journey of E. through the earth and through Paradise in the company of an angel, by whom he is initiated into the secrets of nature, etc.; the *second* contains E.'s account of what was revealed to him concerning the heavenly or spiritual region; the *third* treats of astronomy and the phenomena of the seasons; the *fourth* represents E. beholding in prophetic vision the course of Divine Providence till the coming of the Messiah; and the *last* consists of exhortations based on what has preceded. The book was current in the primitive church, and was quoted by the fathers, but was lost sight of by Christian writers about the close of the 8th c., so that until last century it was only known by extracts. Fortunately, however, the traveler Bruce discovered in Abyssinia three complete MSS. of the work, which he brought to England in 1773. These MSS. proved to be an Ethiopic version made from the Greek one, in use among the fathers, as was evident from the coincidence of language. The Ethiopic version did not appear till 1838 when it was published by archbishop Lawrence. An English translation, however, by the same writer, had appeared in 1821, which passed through three editions, and formed the basis of the German edition of Hoffmann (Jena, 1833-1838). In 1840, Gfrörer published a Latin translation of the work; but by far the best edition is that of Dr. A. Dillmann, who in 1851 published the Ethiopic text from five MSS., and in 1853, a German translation, with an introduction and commentary, which has recently turned the attention of many German scholars to the subject. See Schodde's Eng. trans. (1882).

ENOMOTO KAMAJIRO, one of the Japanese young men of promise sent by the tycoon in 1862 to study in Europe. In Holland, E. obtained a solid training in science and naval practice. Returning to Japan in 1867, he was put in command of the *Kaiyo Maru*, a 26-gun vessel of 400-horse power. The revolution breaking out, and the tycoon being overthrown, E. endeavored to obtain from the United States minister, Gen. Van Valkenburgh, the possession of the *Stonewall*, formerly a confederate iron-clad ram built in England, captured by the United States forces, and purchased and paid for by the tycoon's government. Being unsuccessful, E. left the anchorage near Yedo, with the seven war vessels under his charge, and sailed to Hakodadi. Being disowned by his former master, E. declared himself and his forces independent, and set up a republic somewhat after the model of the United States, of which he was elected president. This government continued for several months, but by June, 1869, the land and naval forces of the mikado had reached Yezo, and battles rapidly followed each other at Esashi, Matsumae, and Kikonai. Finally, June 4, the final conflict took place at Hakodadi. The three vessels of E. were opposed to the five flying the mikado's flag, one of which was the iron-clad ram *Stonewall*. A terrific naval battle was kept up during several days, while the land forces were engaged almost continually. The "rebel" fleet and forts were utterly destroyed, chiefly by the iron-clad, and on the 26th, E. and the leaders surrendered. He was kept in prison until 1872, when he was pardoned and given a position in the Kai Takn Shi (department of colonization of Yezo). In 1874, he was made vice-admiral in the imperial navy, and sent to Russia as minister plenipotentiary, negotiating the treaty by which Russia gave to Japan the Kurile islands. In 1890 he was made minister of state for communications.

ENOS (anciently, *Ænos*), an ancient t. and seaport of European Turkey, in the province of Adrianople, is situated on a rocky isthmus at the mouth of a gulf of the same name, about 35 m. w.n.w. of Gallipoli. It is the port of Adrianople, and has some trade in wool, camels' hair, cotton, leather, silk, etc. Its harbor is commodious, but so shallow, from being choked up with sand, that it admits only small vessels. Pop. 6,000, principally Greeks. The gulf of Enos is about $2\frac{1}{2}$ m. wide at the entrance, extends into the country for about 14 m., and is on an average 5 m. broad.

The town of E. is very ancient. Virgil mentions it (*Æn.* iii. 18) as being one of the towns founded by Æneas, after the sack of Troy; and Homer also attests its antiquity by alluding to it in his great poem (*Il.* iv. 519).

ENOS, ROGER, 1729–1808; an officer in Arnold's expedition to Quebec, but sent back with his troops for lack of provisions. He was afterwards an eminent citizen of Vermont.

EN RAPPORT (Fr.). This phrase is rendered, "in agreement with," "in harmony with." It refers especially to a peculiarly sympathetic relation existing between parties, and may be due to ordinary or mesmeric influence. This expression is in general use in ordinary life, but has a special significance among spiritualists to denote the relations existing between the medium and the subject.

ENRIQUEZ, GOMEZ ANTONIO (properly, **ENRIQUEZ DE PAZ**), a Spanish poet, the son of a baptized Portuguese Jew, was b. at Segovia early in the 17th century. He entered the army in his 20th year, and rose to the rank of capt.; but in 1636, had to flee the country, to escape the persecution of the Inquisition, which suspected him of a secret leaning to the creed of his father. E. settled at Amsterdam, and latterly professed the Jewish faith; in consequence of which, he was burned in effigy by the pious Catholics of Seville, 14th April, 1660. The date of his death is not known. During his residence in Spain, E. had considerable reputation as a dramatic poet. According to his own account, he wrote 22 comedies, which met with great success on the stage, in consequence of which, several of them passed as Calderon's. *La prudente Abigail*; *Engañar para reinar*; *Celos no ofenden al sol*; and *A lo que obligan los celos*, were published under the name of Fernando de Zárate. E.'s comedies show him to have possessed much inventiveness, but in other respects they deserve little praise. Among his other writings are *Las Academias morales* (Rouen, 1642), containing some fine elegiac verse; *La Culpa del primer peregrino* (Rouen, 1644), a mystico-theologic poem; *El siglo Pitagórico* (Rouen, 1647), a series of satirical portraits partly in prose and partly in verse; and *El Samson Nazareno* (Rouen, 1656), an abortive epic. For a notice of E. and his writings, see Ticknor's *History of Spanish Literature*.

ENROLLMENT, entry upon a register or record. In English law it is the registering or entering of any lawful act, as a recognizance, deed of bargain and sale, and the like, on the rolls of chancery, king's bench, common pleas, or exchequer, or by the clerk of the peace on the records of the court of quarter sessions. In the United States the term is employed with reference to vessels engaged in the coasting and home trade, which are *enrolled*, while those employed in foreign trade are *registered*; and the words *registration* and *enrollment* are used to distinguish the certificates to those two classes of vessels. Enrollment applies only to the vessels engaged in domestic commerce, and in voyages along the coast or in inland waters.

ENSCHEDÉ, a t. in the Netherlands, province of Overijssel, lies about 4 m. from the Hanoverian boundary, and 30 m. w.n.w. of Zutphen. Besides fustians and dimities, cottons for export to Java are largely manufactured. Cotton-spinning, bleaching, dyeing, and calendering also employ many of the inhabitants. There are several benevolent institutions, churches of various denominations, a chamber of trade, and grammar-school, in which French, English, and German are taught. In 1889, pop. 7,079.

ENSEMBLE (Fr.), the general effect produced by the whole figures or objects in a picture, the persons and plot of a drama, or the various parts of a musical performance.

ENSIGN was, until 1871, the title of the lowest combatant rank of commissioned officers in the British army, and is derived from their being charged with the duty of carrying the regimental colors or E. (Fr. *enseigne*, Lat. *insigne*). In the hand-to-hand mêlées of the middle ages, the preservation of the colors or standard, as the rallying-point of those fighting under the same leader, was a matter of vital importance, and was only intrusted to the bravest and most trustworthy. The colors were committed to him with imposing ceremony in presence of the assembled regiment, and he had to take an oath to defend them with life and limb, and if need were, to wrap himself in them as a shroud, and devote himself to death. The man who undertook this perilous post received sometimes as much as sixfold the usual pay. It was doubtless in this way that the point of honor arose respecting the colors. History records repeated instances where the oath was kept to the letter. In the modern system of warfare, the regimental colors are seldom exposed to such danger, and the office of E. is of less account.

ENSIGN, in the United States navy, is the national flag. It is also used in the merchant service to designate the country to which the vessel belongs. There is an officer in the navy called ensign, who ranks below master and above midshipman. In the army and the militia an ensign is assigned to each company, his duty being to carry the flag or standard of the company. Sometimes the duty falls to a sergeant.

ENSILAGE, green fodder, preserved for cattle, by a process not unlike that employed in the preparation of sauerkraut. A silo or pit, large or small, is first prepared; usually placed, for convenience of feeding, contiguously to the barn in which cattle are housed. It must be so constructed that the air can be excluded from its contents, and of such form and dimensions as will facilitate their settling into a solid mass, and as, when opened for feeding, will expose to the atmosphere as small a part of the surface as practicable. The construction of a silo 16 to 20 ft. long, 8 ft. wide, and from 15 to 20 ft. deep, is thus described: 12-in. perpendicular walls of hard brick, well laid in cement, with smooth joints. If the ground is sandy or gravelly, the outside of the walls next the earth is covered with a coat of cement, or the walls are filled in behind with clay or clayey earth, to prevent the passage of the air through them. The bottoms are also laid with brick upon the flat in cement. The walls are made so smooth upon their inner sides as to offer no obstacle to the settling and compacting of the food by friction of the sides. The pit may be made either open at the top and covered with a roof, or arched over under ground, with two necks coming up to within one foot of the surface of the ground, through which it is filled. The pit being prepared, the fodder is cut green, when in the best condition, or in bloom, passed immediately through the cutting-machine, to reduce it to uniform short lengths of not more than 1 in., and then deposited and trodden firmly into the pit, sufficient salt being used to render it palatable, but no more. As fermentation—which will commence at once—proceeds, and the mass settles, the cutting and treading in of fresh fodder must be continued from day to day, after an interval of about 36 hours, until the pit is filled and settling has ceased. Then the pit is immediately and thoroughly sealed over the whole top surface of the fodder, by a well-compacted layer of clean fodder, not less than 6 in. thick, excluding the air. Over this layer, some lay planks weighted with heavy stones; others deem this needless. The fodder to be thus treated may be corn, red clover, pearl millet, West India millet, or Guinea corn, green rye, oats, mixed grasses, or any other succulent production of which cattle are fond. Food preserved by this process is greatly relished. It is eaten eagerly and clean, leaf and stalk, without any loss whatever; and stock thus fed exhibit the highest conditions of health and thrift. It is recommended especially for milch cows, as it increases the quantity and improves the quality of milk.

The Greek word *siros*, a pit, and the Spanish word *ensilar*, to store grain in a pit, explains the origin of the word ensilage. Vaults or pits in the ground for the storage of grain are of very early date. In Syria and other parts of the east they are still in use, but it was dried grain that was stored in these early silos. In 1850 the Rev. John Wilson gave a detailed account of the German and East Prussian method of storing green crops in silos. M. Goffart in 1874 stored 250 tons green corn mixed with one fifth of its weight of dry chaff from rye straw. The dimensions of the silos used were—length 12 yds., depth 2 yds. The result was satisfactory, and the process extended rapidly in France. Mr. Morris of Md. and Mr. Mills of N. J. were among the first to try the new process in this country. Mr. Mills, it is said, kept 120 cattle and 12 horses for seven months on the product of 13 acres. Since that time the method has been rapidly extending in the U. S., and seems to be very highly esteemed. A special report was issued on the subject by the U. S. commissioner of agriculture in 1882, and the replies, received from all parts of the country, to the questions asked showed that in the experience of all who had used it, this method of storing food for cattle was successful and economical. It is merely a canning process on a large scale, or doing for the lower animals what has long been done for man—giving them the advantage of a green food in winter. The exclusion of the oxygen of the air, which leads to putrefactive fermentation, is the object to which all the methods tend, and upon which their success depends. The silo of the Vicomte de Chezelles is the largest of which we have any account; its length is 72 yds., width $6\frac{1}{2}$ yds., height above the ground $4\frac{1}{2}$ yds., and its bottom is 4 yds. below the surface. It holds the green crops from 170 acres. In the case of very large silos, they should be partitioned off for convenience in packing. This also prevents exposure of too large a surface of the ensilage to the air while it is being used. Cylindrical forms are highly recommended, and by giving them a sufficient depth much of the weighting can be dispensed with. A silo containing 19,200 cu. ft. will hold about 480 tons. The cost is from four to five dollars per ton when built with stone walls laid in cement. If built above ground, which will serve very well, the walls may be made of two thicknesses of inch boards with sheathing paper between them; the cost of such a silo should not exceed 50 cents a ton. In the case of a very dry soil with good drainage a pit or trench without any wall will suffice. If a simple earthen pit be used more weight must be placed upon it, especially around the edges. In a pit silo the outer portions of the contents are apt to be spoiled, so that in the end it is not economical. Iron has sometimes been used as a material for making the silos. After the silo is filled, weighting it is specially important; this has been done by

means of screws and pulleys. In the U. S. corn is considered the best green crop for storing; its average yield per acre is placed at 20 tons. The crop may be put in from June to October as it reaches the proper stage for cutting; the storage may be carried on in wet as well as dry weather; and in this respect it presents a great advantage, as the farmer runs no risk of losing his crop through a season of rain.

M. Goffart recommends that the pit be filled at the rate of two feet per day. If for any reason the filling has to be stopped, the silo should be covered and weighted till the storing begins again. The cost of filling varies according to circumstances, and no general price can be fixed. A great advantage of Ensilage is that it permits the utilization of a great many green crops that would otherwise be wasted. Salt was at first mixed with the fodder as it was being packed, but is not now much used. As soon as the silo is closed the process of fermentation begins, and a large amount of heat is evolved, due to the vegetable matter undergoing oxidation, which is caused by the oxygen that has not all been forced out. The temperature in some cases rises as high as 60° C. Carbonic acid is produced, and this gas by its pressure keeps out any air that otherwise might enter. The plant cells, when the air has been excluded from them act sluggishly, and do not undergo the destructive decomposition that would take place were air supplied; and by the time that all the oxygen left in the mass has been used up, the substance has become so compact that the air cannot enter, and the cell life continues in a low form till a supply of air is admitted, or till the exposure of the substance to the air, which soon brings decomposition. The heat generated in the first instance is sufficient to destroy the germs that would produce destructive fermentation, and after they are killed none others can penetrate the mass. While the temperature remains high, the process of saccharification goes on, converting some of the carbon compounds into saccharine substance.

The chemical processes that go on in the silo make the substance more digestible, and resemble the change that is supposed to take place in the first stomach of ruminant animals. The effect of the fermentation is to break down the fibrous substance and render it more soluble. The change makes it very palatable to the animals and they seem to prefer it to the green fodder. The analysis of the ensilage compared with that of artificially dried, and field dried Lucerne, shows the following results:

| | Ensilage. | Carefully dried Lucerne. | Field dried Lucerne. |
|---|-----------|-----------------------------|-------------------------|
| Albumenoids..... | 18.35 | 17.00 | 14.94 |
| Fiber | 28.87 | 31.81 | 33.90 |
| Fat, Soluble Carbo-hydrates and Alcohol (if any) } | 38.95 | 43.80 | 44.22 |
| Ash..... | 11.29 | 7.39 | 6.94 |

The acid taste of the ensilage is due to the presence of acetic and lactic acid which are found in small quantities. There is also found a slight trace of alcohol, but not enough to be in the least injurious. As the oxygen left in the mass is used up, the temperature becomes gradually lower, till the ensilage reaches the proper state to be used, generally in three or four months. The material is said to be equal to one third of its weight of the best hay, and its effect on milch cows is like that of turning them into a green pasture. Whether it is good for horses depends upon the green fodder from which the ensilage is made; if that was not suitable for them the ensilage from it will not be. The ration for a cow is 50 or 60 lbs. daily; it has the best effect when fed with a small quantity of dry food. Six tons will keep one cow six months, and a cu. ft. weighs from 40 to 50 lbs., so that the size of a silo to keep a certain number of cows can be readily ascertained. In one experiment seven acres yielded 212 tons of corn ensilage, which kept 35 cows for six months. Mr. Wolcott of Mass. concludes from his experiments that four times as many cows can be kept by using ensilage than by the old plan of dry hay. The ensilage should appear soft, moist, and wholesome, with a slight alcoholic smell somewhat like brewers' grains. It is best to keep it a day out of the pit before using. Care should be taken not to expose the surface of the ensilage to the air any more than can be avoided, and if it can be cut so as to leave a fresh surface each day it is best. There is no trouble about its keeping after the pit is once opened. M. Goffart fed from one of his pits from April to August, the pit remaining open all the time. The material should not be kept for more than a year, as it deteriorates in quality though it has been kept usable for four years.

At the end of June 1884 there were in Great Britain 610 silos, 514 of which were in England. Their total capacity was 1,861,744 cu. ft. The largest one was in the county of Argyll, its length being 60 ft., breadth 60, depth 16. The smallest was 6 ft. long, 4 wide, and 5 deep. See Thorold Rogers's *E. in America* (1883).

ENTABLATURE, that part of a design in classic architecture which surmounts the columns (q.v.), and rests upon the capitals. It is usually about two diameters of the column in height, and is divided in every style of classical architecture into three parts—architrave, frieze, and cornice. These parts vary in their relative proportions in different styles. In Doric architecture, for example, if the E. be divided into eight equal parts, two of these form the height of the architrave, three that of the frieze, and three

that of the cornice. In the other styles, the relative proportions are as three, three, and four.

The term E. was not used till the 17th c., the members composing it being previously simply designated the cornice, frieze, and architrave.

1. *The architrave* is the horizontal portion which rests immediately upon the abacus of the column. It is usually ornamented with horizontal moldings, with flat spaces or *faciæ* between. The upper molding always projects further than the others, so as to throw off the rain. This molding varies in different styles. In Doric, it is a plain square projection, with small pendants or *guttae* under the triglyphs. In the other styles, it is generally an ogee or talon molding. These moldings are frequently enriched with leaf ornaments, and in very florid designs the *faciæ* are also enriched.

2. *The frieze* is the middle portion of the E., between the top of the architrave and the bed of the cornice. In the Doric style, it is ornamented with triglyphs or slight projections, divided by angular grooves into three parts. The spaces between the triglyphs (called metopes) are square, and are either plain or enriched, either with figure-sculpture, as in the Parthenon, or with bulls' heads, pateræ, or other ornaments. In the other styles, the frieze is never cut into portions, but is either left quite plain or ornamented with figure-sculpture or scroll-work. The former is most usual in Greek art, the latter in Roman. In late Roman works, the frieze is sometimes *swelled* or made to project with a curve.

3. *The Cornice* forms the upper portion of the entablature. It is divided into several parts. The lower molding or moldings resting on the frieze are called the bed-moldings—the upper projecting part is called the corona (q.v.), and between the two there are frequently introduced modillions and dentil bands. The bed-molding is generally of an oval or echinus form, and is frequently enriched with the egg and tongue or leaf ornaments. The upper molding of the corona is generally of a *cymarecta* form (see COLUMN, fig. 1), and is often ornamented with lions' heads. These represent the openings through which the rain was at first led off from the roof-gutters, which were cut in the top of this molding, and were retained as ornaments after their original use was discontinued. The corona projects well over the frieze and architrave, and protects them from rain, while at the same time, by its broad shadow, it gives repose and variety of effect to the building. The *soffit*, or under side of the corona, is frequently paneled and ornamented with pateræ.

Origin.—The component parts of the E. are said, with some appearance of truth, to owe their origin to the forms of the construction of the oldest temples. These were of wood, and were put together in the manner most natural for that material. The square beams laid across from post to post are represented by the architrave; the triglyphs of the frieze are copied from the ends of the cross-beams; the cornice is taken from the boarding which covered the rafters and ties of the roof—projected so as to throw off the rain; and the dentils and modillions show the ends of the rafters left uncovered.

Whatever the origin of the E. may have been, it is a remarkable fact, as connected with Greek and Roman art, how persistent the E. was as a feature in the decoration of these classic styles. So long as buildings consisted of one story in height, this was quite natural; but after this simple system was abandoned, and when, as in Roman architecture, series of columns and entablatures were piled one above the other—not used constructionally, but simply applied to the face of the building—the cornice, frieze, and architrave still retained their places and proportions. In the revived Roman art of the 16th c., the E. was used in a manner still further removed from its original purpose. The strict proportions of the various parts were entirely lost sight of. The frieze was increased in height, so as to admit of small windows to light the entresol (q.v.) or mezzanine, and in the French and English forms of the renaissance, the various members become still more attenuated and altered from the original design (see RENAISSANCE). But in no modification of classic architecture, however debased, is the E. wanting. The architrave, frieze, and cornice are essential portions of every classic design.

ENTADA, a genus of climbing shrubs of the natural order *leguminosæ*, sub-order *mimosæ*, having pinnate or bipinnate leaves, and remarkable for their great pods, in which the seeds lie amidst a glutinous or gelatinous substance. The seeds of *E. purshiana*, an East Indian species, are saponaceous, and are used for washing the hair. The plant attains a great size; its pods are sometimes fully 5 ft. long, and 6 in. broad; the seeds are beautiful brown beans, so large that in Ceylon they are often hollowed out and used as tinder-boxes.

ENTAIL, or, as it is frequently called in Scotland, *tailzie*, from Fr. *tailler*, to cut, properly signifies any destination by which the legal course of succession is cut off, one or more of the heirs-at-law being excluded or postponed, and the settlement of land made upon a particular heir or series of heirs. The desire to preserve in our own family land which we have either inherited or acquired, appears to be inherent in the human mind. The first distinct trace of the existence of entails, is to be found in the Roman law. The Greeks, indeed, permitted persons to name successors to their estates, and to appoint a substitute who should take the estate on the failure of him first named. The substitute, as appointed, was permitted to succeed on the death of the institute (as he was called) without leaving issue or without alienating the estate. But this limited

right fell far short of the power of entailing which has since prevailed in various countries. At Rome, under the later emperors, the practice of settling land upon a series of heirs, by means of *fideicommissa* (q.v.), grew up, and was sanctioned by the state. These deeds, which were originally simply a trust reposed in the honor of a friend, to whom the property was conveyed, to carry out the will of the grantor, by degrees received the sanction of the law. In their early form they contained merely a substitution of heirs. Thus, "*Rogo ne testamentum faciat, donec liberos susceperit.*" "*Rogo ut testamento suo Scium heredem faciat.*" "*Rogo heredem, ne hereditatem alienet, sed relinquat familie.*"—Heineccius, s. 658. But by the later law, a much fuller form of settlement was admitted, whereby the estate was protected from every sort of alienation. "*Volo meas aedes non vendi ab heredibus meis, neque fenerari super eas: sed manere eas firmas, simplices, filiis meis et nepotibus in universum tempus. Si aliquis autem eorum voluerit vendere partem suam, vel fenerari super eam, potestatem habeat vendere coheredi suo et fenerari ab eo: si autem aliquis præter hæc fecerit, erit quod obligatur, inutile atque irritum.*"—Dig. xxxi. 88, s. 15. Here we have an example of the principal clauses of a strict E. as subsequently more fully carried out in Scotland. It is impossible to doubt that this Roman form must have been adopted by the Scottish lawyers in framing their deeds of entail. The limitation to a particular line of descent, the prohibition to alienate or burden with debt, and the still more peculiar feature of the declaration of forfeiture in case of non-compliance, are to be found in both forms. There are, however, two points in which the Roman law differed from that which prevailed for many years in Scotland—viz., that the former did not recognize the right of primogeniture, and that the limitation of the deed was restricted to four generations. For the right of primogeniture, as recognized in deeds of E., we are indebted to the feudal law. That system, which has united with the civil law to form a basis for the codes of modern Europe, did not, in its original form, recognize the right of a holder of land to alienate his feudal benefice. But the right of the eldest son to represent his father, both in the duties and privileges of the fief, if not an original principle of the system, was universally recognized in the days of its greatest power. We shall presently see how this principle was embodied in a Scottish deed of entail. We come now to consider entails as they have existed in modern nations.

In *England*, the Saxons, it is said, prohibited the alienation of lands by those who had succeeded to them under condition that they should not alienate.—Wilkins's *Leges Saxonice*, p. 43 (note). Among the Saxons, the law of primogeniture was not recognized. But on the establishment of the feudal laws in England, a practice began to prevail whereby an estate was settled upon a particular series of heirs, as "to a man and the heirs of his body." This is the first germ of an entail in England. It was called a fee-simple conditional, because the judges refused to recognize an absolute limitation of the estate to a particular line of heirs, but held the destination to be conditional on the birth of an heir, and that that condition having been purified, the donee was free to alienate the estate. The common law thus refusing to recognize entails, a statute was passed which had the effect of introducing that practice into England. This was the famous statute *De Donis* (q.v.), whereby it was declared that the estate should be held *secundum formam doni*. In order to the creation of an entail under this statute, it was not enough that the estate was limited to "a man and his heirs," as those words were held to constitute an estate in fee; it was necessary that the estate should be given to "a man and the heirs of his body," or "to a man and the heirs of his body by his wife Joan." The former was called a general, the latter a special entail. Another form whereby lands might be entailed under the statute *De Donis*, was by settlement in Frank-marriage (q.v.). For nearly 200 years after the passing of this act, lands settled in the form which it prescribed continued to be held under the fetters of a strict entail. But the tendency of the law, which in Scotland, as we shall presently see, was to strengthen the power of entails, was, in England, in the opposite direction. For a long time, tenants in tail, taking advantage of legal technicalities, were able practically to defeat the limitation in tail by means of a discontinuance. But it was not till the time of Edward IV. that an effectual means of evading the provisions of the act was brought into use; this was achieved by means of a process called a common recovery. See *FINE OR LANDS*. By this process, a tenant in tail could bar the E., and convert the estate into a fee-simple. Another mode of barring an E. was by means of a fine. It had been declared by the statute *De Donis*, that levying a fine of lands should be no bar to the E.; but by 32 Hen. VIII. c. 36, it was enacted that a fine of lands, when duly levied, should be a complete bar to the tenant in tail, and those claiming under him. It is to be observed that the operation of a fine was confined to those claiming under the tenant in tail; those who had rights of reversion or remainder under the grantor of the E. were not excluded by this species of assurance; so that by means of a recovery only could an estate tail be converted into a fee-simple. From the introduction of common recoveries till the passing of the fines and recoveries act (3 and 4 Will. IV. c. 74), a period of more than 300 years, it was impossible that an estate could be held under the fetters of an E., if the tenant in tail and the next heir chose to combine to defeat the entail. By the fines and recoveries act, the technicalities formerly necessary in order to bar an E. were removed, and tenant in tail may now, by a simple conveyance, alienate his estate at pleasure. An estate tail is a freehold of a limited

description. Tenant in tail may commit waste (q.v.). Formerly, an estate tail was not liable to the debts of the tenant, but by 1 and 2 Vict. c. 110, this restriction has been removed. Copyhold lands have been held not to fall under the operation of the statute *De Donis*. A limitation, therefore, which in a freehold creates an estate tail, in copyhold lands creates a fee-simple conditional, according to the old common law, except where the custom of the manor is to the contrary.

In Scotland, as in England, entails appear first to have taken their rise from the feudal usages. It has been observed by lord Kames, that while the feudal system was in its vigor, every estate was in fact entailed, because no proprietor had any power to alter the order of the succession. But when the stricter feudal principles gave way, and the power of alienating land began to be recognized, the holders of estates sought to secure, by deed, in their own families the lands which they possessed. The form first adopted for this purpose was the simple destination, whereby the estate was simply limited to a particular series of heirs, without prohibition to alienate, or declaration of forfeiture for contravention of the will of the grantor. In this form, the deed must have resembled the early English entails. The feudal law of primogeniture having been received as a principle of common law, the estate would naturally descend from father to son in the line indicated by the deed. But, as it was held that those succeeding under this deed were not restrained from alienating, the practice of adding prohibitory clauses was introduced. Entails in this form were held to bind the heir from granting gratuitous alienations; but he was not restrained from selling the estate, or burdening it with debt. Early in the 17th c., a further addition was made to the form of the deed by the introduction of irritant and resolute clauses, i.e., clauses declaring the act of alienation to be null, and to infer the forfeiture of the estate. The form thus adopted, which resembles closely the form of the Roman deed already noticed, was fortified by a decision of the court of session in the *Stormont E.*, M. 13,994, holding that an estate so protected could not be attached by creditors. This decision created much difference of opinion amongst lawyers as to the power of the grantor thus to protect an estate from the onerous act of the heir, in consequence of which the famous Scotch E. act, 1685, c. 22, was passed, by which it was enacted that an estate conveyed by a deed fortified by prohibitory, irritant, and resolute clauses, and recorded in a particular register, should be effectually secured in the line of destination. This act has always been most strictly viewed by Scottish lawyers; and entails which have been found deficient in any of the prescribed requisites, have been regarded by the courts as utterly ineffectual. The first lord Meadowbank, in a judgment which has always been regarded as a leading authority, laid it down that entails "are the mere creatures of statute," and that where the interests of third parties are concerned, every part of an E. is liable to the strictest interpretation (*Hamilton v. Macdowall*, 3d Mar., 1815). The operation of the old E. act was found, notwithstanding, to be of the most oppressive character. Statutes were in consequence passed from time to time, empowering heirs of E. to exercise larger powers of ownership than could be granted under the act 1685, and to make provisions for their families. At length, by 11 and 12 Vict. c. 36, and 38 and 39 Vict. c. 61, the power of fettering lands by a strict E. has been finally destroyed. By this act, heirs under an existing E. may disentail, with the consent of certain heirs next in succession; and in all entails made after 1st Aug., 1848, and also in old entails where the heir in possession was born since 1st Aug., 1848, the heir of E. in possession may, by means of a simple deed of disentail, free his estate from the restrictions of the entail.

In America, before the civil war, the English law as to estates tail prevailed. But in the United States the law of entails has been gradually abandoned by the several states; and property can now be fettered, to a limited extent only, by means of executory devices (q.v.). In France, the power of creating entails has varied much at different periods, from the right to make a perpetual E., which appears to have been the original principle, to a limitation to four, and at one time to two degrees. But by the code Napoleon, ss. 896-897, entails are now absolutely prohibited. In Spain, also, entails, which were permitted under certain restrictions, have been entirely abolished by a law of the cortes in 1820. Thus it will be seen that the right of securing land in a particular family, which commends itself to the natural feelings, has been found so oppressive in operation, and so injurious to the public interest, that after an existence of more than 600 years it has been practically discarded almost simultaneously by the general consent of modern nations.

Gardiner's Island (q.v.), the oldest of the manorial grants in the colony of New York, and confirmed as a manor and lordship in 1668, is believed to be the only property in the United States still (1891) held in entail by direct descendants of the grantee. Down to 1829 it descended in unbroken succession from father to eldest son, and then passed, through lack of issue, to a younger branch of the family.

ENTAIL, or ENTAYLE (Fr. *tailler*, to cut), often used by old English authors for any architectural ornament which is sculptured or cut in stone. Chaucer speaks of

"An image of an other entaille;"

and other examples are given by Parker (*Glossary of Architecture*).

ENTASIS (Gr.), the swelling outline given to the shaft of a column (q.v.).

ENTELECHY (Gk. *perfection*), the absoluteness, actuality, actual being of a thing, opposed to mere potentiality or capability. The term was employed by Aristotle in his psychology. In Aristotle's view, the world is a perpetual process of development, a ceaseless transformation of that which merely has the *power of being* into that which actually exists. Existence therefore shows two inseparable and correlative aspects of its operations—a state of *potentiality* or capability on the one hand and a state of *realization* on the other, this realization being itself in turn only a stage of potentiality for the development of some other aspect of reality. Without soul, the body is a mere potential existence, a mere possible substratum for development in the future: it is nothing actual or real. Just as the seed reaches its true meaning in the tree, so the soul constitutes the real significance of the body. Soul is thus not only the realization, the true meaning of body, but also in a sense its end, for when an organism has advanced so far as to possess a soul, it has reached, as it were, the last stage in development. Entelechy in short is the realization which contains the end of a process, the complete expression of some function, the last stage in the process from potentiality to actuality. Iron, for example, exists potentially in its ore, which must be worked to be made iron. When this is done, the iron exists in entelechy. Aristotle makes a distinction between *first* and *second* entelechy, calling the soul the first entelechy of the body. Any development may be either implicit or explicit. For example, the knowledge through which man gains the perfect realization of his faculties may be either knowledge possessed but dormant in the mind, or it may proceed to something further and be this same knowledge consciously used and applied. Now it is in the first of these two senses that soul is the entelechy of the body. It is the first or earliest, the relatively dormant or implicit realization in which our bodily processes attain their real truth. To sum up, by calling the soul the first entelechy of the body, Aristotle means that it is the perfect development which having reached the stage of realization is nevertheless capable of continued action. "First entelechy is being in working order, second entelechy is being in action." This article is based chiefly on Edwin Wallace's *Aristotle's Psychology*, page XLIII. See also Trendelenburg ad Arist. de Anima, pp. 295 seq.; and Brandis, *Aristoteles und seine Akademischen Zeitgenossen*.

ENTELLUS MONKEY, or **HONUMAN** (*semnopithecus entellus*), an East Indian species of monkey, with yellowish fur, face of violet tinge, surrounded with projecting hairs, long limbs, and very long, muscular and powerful—though not prehensile—tail. It is held in superstitious reverence by the Hindus, and is often to be seen exhibiting much impudent familiarity in the precincts of temples; indeed, temples are often specially dedicated to it; hospitals are erected for its reception when sick or wounded. Hindu laws affix a far more severe punishment to the slaughter of one of these sacred monkeys than of a man; the peasant esteems it an honor when his garden is plundered or his house robbed by troops of them, and would consider it an act of the greatest sacrilege to drive them away. They take their places with perfect confidence on the roofs of houses, and gaze at the passing crowd. This is one of the very few species of monkeys found in the northern provinces of India, and in summer ascends the Himalaya to the pine-forests, and almost to the snow-line; it has even succeeded in crossing the mountains, and occurs in Bhotan.

ENTERIC FEVER is another name for enteritis, which will be found described below.

ENTENTE CORDIALE (Fr.). This expression denotes literally a friendly or cordial understanding; but it is used specifically in politics to denote the friendly relations existing between different countries and statesmen. It may be said, for example, that an *entente cordiale* now exists between England and the United States.

ENTERITIS (Gr. *enteron*, the intestines), inflammation of the bowels, and especially of their muscular and serous coat, leading to constipation (q.v.) and pain, with colic (q.v.), and sometimes ileus (q.v.). E. is distinguished from these last affections, indeed, only by the presence of inflammatory symptoms—i.e., pain, tenderness, fever, etc., from a very early stage of the disease, and in so decided a form as to require special attention. If E. does not depend upon mechanical obstruction, it may be combated by hot fomentations, with moderate leeching and counter-irritation, and the internal administration of opium. Injections of warm water, or of asafetida and turpentine (see **CLYSTER**), should be at the same time given to clear the lower bowel; and all purgatives, except in some cases castor oil, should be avoided. The disease is, however, one of great danger, and should never be incautiously treated with domestic remedies. It is closely allied to peritonitis (q.v.), and often depends upon internal mechanical causes, or on external injury.

In the Lower Animals.—Inflammation of the bowels, among the heavier breeds of horses, generally results from some error of diet, such as a long fast, followed by a large, hastily-devoured meal, indigestible or easily fermentable food, or large draughts of water at improper times. When thus produced, it is frequently preceded by stomach staggers or colic, affects chiefly the mucous coat of the large intestines, and often runs its course in from eight to twelve hours. With increasing fever and restlessness, the pulse soon rises to 70 or upwards, and, unlike what obtains in colic, continues throughout considerably above the natural standard of 40 beats per minute. The pain is great, but the animal, instead of recklessly throwing himself about, as in colic, gets up and lies down

cautiously. Respiration is quickened, the bowels torpid. Cold sweats, stupor, and occasionally delirium, precede death. When connected with, or occurring as a sequel to influenza, laminitis, and other complaints, the small intestines are as much affected as the large, and the peritoneal as well as the mucous coat of the bowels. This form is more common in the lighter breeds. When the patient is seen early, whilst the pulse is still clear and distinct, and not above 60, and the legs and ears warm, blood-letting is useful, as it relieves the overloaded vessels, and prevents that exudation of blood which speedily becomes poured out in the interior of the bowels. This disease should be treated as follows: In a pint of oil, or an infusion of two drams of aloes in hot water, give a scruple of calomel and an ounce of laudanum, and repeat the calomel and laudanum every hour in gruel until the bowels are opened, or five or six doses are given. Encourage the action of the bowels by using every half-hour soap and water clysters, to which add laudanum so long as pain and straining continue. If the animal is nauseated and stupid, with a cold skin, weak quick pulse, bleeding and reducing remedies are very injurious; and the only hope lies in following up one dose of the calomel and aloes with small doses of laudanum and sweet spirit of niter, or other stimulants, repeated every forty minutes. In all stages, woolen cloths wrung out of hot water and applied to the belly encourage the action of the bowels, and relieve the pain.

E. in cattle is mostly produced by coarse wet pasture, acrid or poisonous plants, bad water, and overdriving. The symptoms are fever and thirst, a quick but rather weak pulse, restless twitching up of the hind limbs, tenderness of the belly, and torpidity of the bowels. Calves generally die in three or four days, other cattle in a week or nine days. Bleed early, open the bowels with a pint of oil and a dram of calomel, which may be repeated in eight or ten hours, if no effect is produced. Give every hour fifteen drops of Fleming's tincture of aconite in water, until six or seven doses are given. Allow only sloppy and laxative food, such as treacle, gruel, or a thin bran mash; employ clysters and hot cloths to the belly, and use two ounce doses of laudanum if the pain is great. E. in sheep mostly occurs in cold exposed localities, and where flocks are subjected to great privations or improper feeding.

ENTEROPNEUSTA (Gr. "gut-breathers") a class of worm-like animals having paired respiratory pouches opening from the front part of the alimentary canal. Its members, which in their characters resemble vertebrates, include *balanoglossus* and *cephalodiscus*.

ENTERPRISE, a town and winter resort in Volusia co., Fla.; on lake Monroe, the Jacksonville, Tampa, and Keywest railroad, and the St. John's river line of steamers; 198 miles s. of Jacksonville. It is on the opposite side of the lake from Sanford, has several hotels and, near by, a noted sulphur spring, and is much frequented by rheumatic persons.

ENTHYME (Gk., from the verb *enthumeisthai*, "to revolve in the mind"), a term used by Aristotle, to denote the rhetorical syllogism, viz., a syllogism "from *probabilities* and *signs*." The *probability* is a general proposition, stating that which usually happens, as, "wise men are just." By *sign* he designated particular propositions, as, "Socrates is just," or according to others, "by signs he designates facts or marks, such as attend on other facts or conceptions, so that from the presence of the sign we suspect or know that the thing signified is present." The sign may be either fallible or infallible. If we say, "Wise men are just, for Socrates was wise and just," we have an enthymeme from a fallible sign, the implied syllogism being "Socrates was wise; Socrates was just (sign); therefore, all wise men are just." If we say, "Here is a sign that he is ill—he is feverish," our enthymeme is using an infallible sign, the syllogism being, "all who are feverish are ill; he is feverish (sign); therefore, he is ill." The premises of such syllogisms seldom belong to the class of necessary facts. "The propositions from which enthymemes are taken," says Aristotle, "will sometimes be necessarily true, but more often only contingently true." Aristotle did not regard the suppression of one premise in the statement as essential to the enthymeme. This is shown by his remark that the enthymeme may often be more concisely stated than the full or normal syllogism. There is no reason why the rhetorical reasoner should not state both his premises, if he finds it convenient or effective to do so. Since, however, one of the premises is often left to be supplied, some of the later writers on rhetoric came to treat this as part of the essence of the enthymeme. Thus, Quintilian says of the enthymeme, "Some call it a rhetorical syllogism, others an imperfect syllogism." In accordance with this idea, Webster defines enthymeme thus: "An argument consisting of only two propositions, an antecedent and a consequent deduced from it; as, We are dependent; therefore, we should be humble. Here, the major proposition is suppressed. The full syllogism would be: Dependent creatures should be humble; we are dependent creatures, therefore we should be humble."

ENTOMOLOGY (Gr. *entomon*, an insect, *logos*, a discourse), the science which has insects (q.v.) for its subject. The mere collector of insects may be one of the humblest laborers in the great field of natural history, but his labors contribute materials for the more philosophic naturalist who studies the structures of these creatures, and compares them with one another according to the unity and the variety of design which they exhibit. And when we begin to take into account the vast number of different species of insects, their great diversities of structure and of habits, their great complexity of organization,

the wonderful transformations which many of them undergo at different stages of their existence, and the equally wonderful but extremely various instincts which many of them display, we find E. to be a science worthy to engage the noblest mind. But besides all these things, we must remember that insects serve most important purposes in the general economy of nature; and that some of them are directly useful to man, some directly injurious, at least when their numbers are at any time excessively multiplied.

E., along with the other branches of natural history, was cultivated by Aristotle and other Greeks. Aristotle is the most ancient author of whose works anything relating to this science now remains. Pliny has little on this subject but what is copied from Aristotle; and it can scarcely be said to have been again studied as a science till the 16th c., when attention began once more to be directed to it, although it was not till the 17th c. that much progress was made, or that any important works on E. appeared. Insects then began to be described, not only those of Europe, but also some of the curious and splendid insects of tropical countries; bees and other insects of particular interest received attention; the metamorphoses of insects began to be studied, and their anatomy to be investigated. The names of Goedart, Malpighi, Swammerdam, Leuewenhoek, and Ray deserve to be particularly mentioned; but the infant state of the science may be illustrated by the fact, that about the end of the 17th c., Ray estimated the whole number of insects in the world at 10,000 species, a number smaller than is now known to exist in Britain alone. In the 18th c., the name of Linnæus occupies as high a place in the history of E. as in that of kindred branches of science. The progress of the science was much promoted by his arrangement and exhibition of the discoveries of previous and contemporary naturalists; and by his system of classification, founded on characters taken from the wings, or their absence, a system professedly artificial, yet so harmonizing with the most natural distribution into groups, that some of its orders were indicated by Aristotle, and that it has retained and seems likely to retain its place, modified, indeed, but not essentially changed. De Geer and Fabricius are perhaps, after Linnæus, the most worthy to be named of the great entomologists of the 18th century. At the close of the 18th and beginning of the 19th c., the name of Latreille is pre-eminently conspicuous; and in the year 1815, a new impulse began to be given to the study of E. in Britain by the publication of the admirable *Introduction to Entomology* of Messrs. Kirby and Spence, a work combining in a remarkable degree the merits of being at once popular and scientific. Since the beginning of the 19th c., the number of insects known and described has prodigiously increased; many entomologists have with great advantage devoted themselves particularly to the study of particular orders of insects; and many valuable monographs have appeared. Entomological literature has now become very extensive. The progress of the science has owed not a little to entomological societies, of which the entomological society of London may be particularly mentioned. We cannot attempt to enumerate the distinguished entomologists of the 19th c., but perhaps the names of Leach, Macleay, Curtis, Stephens, Westwood, Smith, Walker, Stainton, Swainson, and Newman, deserve particular notice among those of Britain; Meigen, Jurine, Gyllenhal, Gravenhorst, Hubner, Dufour, Boisduval, Erichsen, and Lacordaire among those of the continent of Europe; and Say among those of America. It is to be regretted that we have not yet any complete work on the insects of Britain. The *Insecta Britannica*, of which some volumes by different authors have been published under the auspices of the entomological society, is intended to supply the want. See also American works on ants, by McCook; Packard, *Guide to the Study of Insects*; Our Common Insects; Harris, *Insects Injurious to Vegetation*; Scudder, *The Butterflies of the Eastern United States and Canada*.

ENTOMOSTRACA (Gr. insect-shells), a term introduced by Müller, and adopted by Latreille, Cuvier, and other naturalists, to designate the second of their two great divisions of crustaceans (q.v.). The number of species of E. is very great. They are all of small size, except the king-crabs (*limulus*), which in many respects differ from all the rest, and have recently been formed by some naturalists into a sub-class of crustaceans by themselves. Many of them are minute, and exist in great numbers both in fresh and salt water, particularly in stagnant or nearly stagnant fresh water, affording to many kinds of fishes their principal food. They differ very much in general form; the number of organs of locomotion is also very various—in some very few, in some more than 100—usually adapted for swimming only, and attached to the abdominal as well as to the thoracic segments; but there never is a fin-like expansion of the tail, as in some of the malacostracous crustaceans. The antennæ of some are, however, used as organs of locomotion. Some of the E. have mouths fitted for mastication, and some for suction. Not a few are parasitic. The heart has the form of a long vessel. One or two nervous knots or globules supply the place of a brain. The organs of respiration are in certain species attached to some of the organs of locomotion, in the form of hairs, often grouped into beards, combs, or tufts, or blade-like expansions of the anterior legs are subservient to the purpose of respiration; in others, no special organs of respiration are known to exist. The eyes are sometimes confluent, so as to form a single mass—one eye—in the front of the head. The name E. has been given to these creatures in consequence of most of the species having shells of one or two pieces, rather horny than calcareous, and of very slender consistence, generally almost membranous and transparent. In

very many, the shell consists of two valves, capable of being completely closed, but which, at the pleasure of the little animal, can also be opened so as to permit the antennæ and feet to be stretched out.

The study of the smaller crustaceans has recently been prosecuted with great assiduity and success, by Milne-Edwards and others; and in consequence of the great differences existing among them, new classifications have been proposed, and the name *E.* has by some been restricted to those which have a mouth formed for mastication, but no special organs of respiration, forming a section which is subdivided into two orders, *ostrapoda* and *copepoda*, the former having a bivalve shell or shield, the latter destitute of it.—But the name *E.* is still commonly employed in its former wider sense.

ENTOMOSTRACA, FOSSIL. *E.* attained their maximum size in the palæozoic waters, which they tenanted in vast shoals. The Silurian trilobite (q.v.) was a phyllopod, and the pteregotus of the old red sandstone was nearly allied to the modern limulus. Small bivalvular species are found in all strata, sometimes, as at Burdie-house, near Edinburgh, forming layers of considerable thickness, at others scattered in enormous numbers in the dried sediments of lakes, as in the fresh-water clays of the Wealden, or forming in some places a large proportion of chalk, with the multitudes of their thin calcareous coverings.

ENTOPHYTES (*Entophyta*; Gr. *enton*, within, and *phyton*, a plant), a term usually employed to denote those parasitic plants which grow on living animals. It is seldom extended to vegetable parasites which grow on living vegetables, whether on external or internal parts, nor is it restricted to those which are found in the internal cavities, or within the substance of animal bodies, but includes all which have their seat on living animal tissues. It does not, like the analogous term *entozoa*, denote any particular class of organized beings; some of the *E.* are *algæ*, and some *fungi*, but to these two orders they are limited, and all of them belong to the lower sections of these orders; some of them to those lowest sections in which the distinguishing characters of the two orders cannot easily be traced, so that they are referred to the one or the other on very slender grounds; those in which a coloring matter is present being reckoned *algæ*, although it can be observed only in masses of aggregated cells, and not in the cells when viewed separately, and those which even in the mass appear entirely colorless, being considered *fungi*. Many of the *algæ* and *fungi* parasitic on plants are nearly allied to those which occur on animals; thus, ergot and the kind of mildew which has proved so destructive to vines, are referred to the same genus (*oidium*) to which is also referred the fungus found in the diseased mucous membrane in cases of *aphthæ* or *thrush*: and another genus (*botrytis*, q.v.) contains the fungus called muscardine, or silkworm rot, so destructive to silkworms, together with the fungus which accompanies or causes the potato disease, and many other species which infest plants. Common mold is even supposed to occur on animal tissues tending to decay, during life, as well as on dead animal and vegetable substances.

Vegetable parasites occur both in man and in the lower animals; not a few of them are peculiar to fishes, and more are peculiar to insects than to any other class of animals. The fungi which grow on the bodies of insects sometimes attain an extraordinary development: *sphaeria Sinensis*, which grows on a Chinese caterpillar, and to which medicinal virtues, probably imaginary, are ascribed in China, attains a length greater than that of the caterpillar itself. A similar species (*S. Robertsi*) is found on the caterpillar of a New Zealand moth.

The situations in which *E.* occur are very various. Some, like the thrush fungus already noticed, appear in diseased conditions of the mucous membrane; some find their place in the lungs, the ear, or other organs; some on the skin, in the hair follicles, and *in* as well as *on* the hair itself. The “fur” which appears on the tongue when the stomach is disordered, abounds in the extremely slender unbranching threads of the *algæ* called *leptothrix buccalis*, which also vegetates luxuriantly in cavities and corners of the teeth not sufficiently visited by the tooth-brush. The lungs of birds, the gills of fishes, the intestines of insects, the wing-covers of beetles, the eggs of mollusks, all have their peculiar vegetable parasites by which they are sometimes infested.

It is often by no means easy to say whether the presence of *E.* is to be regarded as the consequence or as the cause of disease; sometimes it may be both. Sometimes it appears to be certainly a consequence, as when the *sarcina* (or *merismopæ*) *diacentriculi* occurs in the contents of the stomach and bowels; sometimes, as in the diseases called *favus*, *porrigo*, *tinea*, *herpes tonsurans*, *plica polonica*, *mentagra*, *pityriasis versicolor*, etc., it seems entitled to be regarded as the cause of the diseased state, and the cure of the disease seems to be accomplished by killing the parasite, often a thing of no little difficulty.

Whence the germs of *E.* are derived is often a question to which it would not be easy to find an answer. Their spores are extremely minute; but there are no plants which produce seeds or spores more abundantly than some of them do; the growth of the plants themselves is very rapid, and reproduction is “very intense and rapid.”

It has sometimes been imagined that epidemic diseases may be caused by spores of *E.* conveyed through the air; no evidence has, however, been produced to render this

opinion probable. An attempt was made to establish the existence of cholera fungi or algæ, but it completely failed.

ENTOZO'A. This term is applied to all the animal forms which live either in the natural cavities (as, for example, the intestinal canal), or in the solid tissues (as, for example, the liver) of other animals. The number of these parasites is so great (there being at least 20 distinct species of worms found in man, 14 in the dog, 15 in the horse, 11 in the common fowl, etc.), and their occurrence so frequent, especially in some of the lower animals, that we must regard their presence, at all events in many species, rather as the normal condition, than as a morbid state due to accidental causes.

It is worthy of notice, that many of the animals included amongst the E. only enjoy a parasitic existence during a part of their total life, which often, as in the well-known case of perfect insects, presents very varied and distinct phases. Thus, for example, the larvæ of the gadfly (*œstrus equi*) undergo their entire development in the stomach of the horse, attaching themselves by minute hooks to the gastric mucous membrane; they then detach themselves, pass along the intestines, and in due time are discharged, and undergo their further changes externally; and many similar instances might be quoted. For this reason, and additionally because parasites are now known to belong to various classes of animals, we no longer attempt, like Linnæus and Cuvier, to form a special group of E.; and a reference to the *vermes intestinales* in the *systema naturæ*, or to the *entozoaires* in the *règne animal*, at once shows that these illustrious naturalists grouped together animals with few or no true natural affinities.

Although most E. belong to the class of *vermes*, or *worms*, this, as has been already observed, is by no means exclusively the case. Thus, even fishes may lead a parasitic existence; a fish of the genus *flæasfer* being frequently found in the respiratory cavity of the *holothuria tubulosa*, or *sea-cucumber*, and small fishes having been frequently observed in the cavity of the *asteria discoides*. Amongst the crustaceans, instances of parasitism are by no means rare; different species of *lernæa* being abundant in the branchial (or gill) cavity, and on the surface of numerous fishes, while the *linguacula* infest mammals, reptiles, and fishes, being found in the olfactory sinuses, the larynx, the lungs, the peritoneal cavity, etc. The instances in which mollusks are found to live parasitically are few; certain gasteropods, however, inhabit the bodies of echinoderms, holothurians, and comatulas; and amongst the lamellibranchiates, species of *modiolaria* and *mytilus* live in the bodies of ascidians. There are several cases of polyps which have been observed to adopt a parasitic existence; and finally, various protozoa are not unfrequently met with in the animal fluids; for example, certain species of *vibrio*, *cercomonas*, and *paramecium*, have been found in the intestinal evacuations in cholera and diarrhea; *monads* have been found in the urine in cholera, and certain infusoria and rhizopoda in the blood of the dog, the frog, and many other animals. See HEMATOZO'A.

The more common kinds of E. appear to have attracted the notice of the earliest physicians and naturalists whose opinions or works have reached us. Hippocrates speaks of several worms, especially the tæniæ and ascarides, infesting the human intestinal canal; and Pythagoras learned in India that the bark of the pomegranate acted almost as a specific in cases of tape-worm. Aristotle noticed both the tape-worm of the dog and of man, and the *cysticercus cellulosa* (see CESTOID WORMS) of the pig; but utterly unconscious that the cysticercus, under favorable conditions, became developed into a tape-worm (see TAPE-WORM), referred the origin of all intestinal worms to spontaneous generation—a doctrine that seems to have been generally adopted till the 17th c., when Redi published (in 1684) a work on helminthology, in which he distinctly showed that the generation of various E. followed the same laws as in higher animals, and that in many instances there were distinct males and females. The great recent discovery, that the vesicular or bladder-like parasites, such as the different species of cysticercus and cœnurus, are cestoid worms in an early stage of development, is alluded to in CESTOID WORMS, and will be more fully noticed in the article TAPE-WORM.

Another point of general interest in connection with E. is the part of the body in which they are found. While most live in the intestinal canal and other open cavities (as the larynx, bronchial tubes, etc.), others are found in the closed cavities and in the parenchymatous tissue of the liver and other solid organs. Thus (confining our remarks to the E. occurring in man), *anchylostoma duodenale*, *strongylus duodenalis*, two species of *ascaris*, *oxyuris vermicularis*, *trichocephalus dispar*, *distoma heterophyes*, at least four species of *tænia*, and *bothriocephalus latus*, have been found in different parts of the intestinal canal; while *strongylus gigas* inhabits the kidney, another species of *strongylus* the lungs, a species of *spiroptera* the bladder, two species of *filaria* and *monostoma lentis* the eye, *trichina spiralis* the voluntary muscles, two species of *echinococcus* and *cysticercus cellulosa*, various parenchymatous tissues, two species of *distoma* the gall-bladder, another species the portal vein, and the *filaria medinensis*, or *guinea worm*, the subcutaneous tissue.

Davaine, who may be regarded as one of the highest living authorities on this subject, gives the following synopsis of the E. occurring in man and the domestic animals (see his *Traité des Entozoaires*, Paris, 1860).

TYPE I. PROTOZOA, including the genera *bacterium*, *vibrio*, *monas*, *cercomonas*, *trichomonas*, *paramecium*.

TYPE II. CESTOIDEA, including the families of *teniadæ* and *bothriocephalidæ*. The *teniadæ* occur (1) in their undeveloped, cystic, or vesicular form, constituting the genera *cœnurus* and *cysticercus*; and (2) in their perfect, ribbon-like shape, constituting the genus *tenia*, of which about 20 species have been described. The *bothriocephalidæ* contain the single genus *bothriocephalus*, which embraces various species. Their early or vesicular stage has not yet been described.

TYPE III. TREMATODEA, including two well-marked secondary types: (1) The *poly-stomidæ*, which live as epizoa on the skin or gills of aquatic animals, and which do not concern us here; and (2) the *distomidæ*, including the genera *monostoma*, *distoma*, *holostoma*, *amphitoma*, with the doubtful genera of *tetastoma* and *hexathrydium*.

TYPE IV. ACANTHOCEPHALA, with the single genus *echinorhynchus*.

TYPE V. NEMATOIDEA. Passing over two cases in which these worms have been discovered, apparently in their larval or imperfectly developed state (once by Rainey in the human trachea, and once by Vulpian in the kidney of the dog), Davaine gives the following genera, *oxyuris*, *ascaris*, *spiroptera*, *trichina*, *trichosoma*, *trichocephalus*, *filaria*, *doelmeius*, *sclerostoma*, *strongylus*, *anchylostoma*, *dactylius*.

TYPE VI. ACANTHOTHECA, including the genus *pentastoma*.

Alarming as the above list may seem, comparatively few of the worms contained in it do in reality give rise to dangerous or severe symptoms. It seems to be a condition of parasitism, that the animal upon which the parasite lives must not be destroyed by it; and it has been suggested by one of our highest authorities on this subject, Van Beneden, that in many cases the parasite does not so much attack the organism in which it exists, as its superabundant products. Dujardin and other helminthologists have described cases in which worms were developed by thousands in persons apparently in good health. The symptoms occasioned by ascariides, tæniæ, etc., are described in the articles **ASCARIS**, **TAPE-WORM**, etc.

The multiplication of worms is most rapid in debilitated persons, especially children living in cold and damp situations; and impure water, unripe fruits, and raw or imperfectly cooked meat, have considerable influence on the development of these animals. For the description of the medicines used for their destruction, see the article **VERMIFUGES**; and for information regarding the structure and habits of the most important E., see the articles **ASCARIS**, **BOTHRIOCEPHALUS**, **CESTOID WORMS**, **GUINEA-WORM**, **MONOSTOMA**, **NEMATOIDEA**, **STRONGYLUS**, **TAPE-WORM**, **THREAD-WORMS**, **TREMATODA**, **TRICHINA SPIRALIS**, **TRICHOCEPHALUS**. See *illus.*, **WORMS, ETC.**, vol. XV.

ENTR'ACT, in music, is an instrumental piece, composed in the form of a little symphony or overture, to be performed between the acts of a play.

ENTRÉ DOURO E MINHO, or, as it is frequently called, **MINHO**, a province of Portugal, in the extreme n.w. of the country, is bounded on the n. by Galicia, from which it is separated by the river Minho; on the e. by Galicia and Trás-os-Montes; on the s. by the province of Beira, from which it is separated by the river Douro; and on the w. by the Atlantic ocean. It has an area of about 2,807 sq. m. and a pop. (1890) of 1,098,356. It has been called the paradise of Portugal, and indeed it may be doubted whether any territory in Europe of equal extent exhibits so much beauty. It is traversed from n.e. to s.w. by three mountain-ranges, which, however, sink down as they approach the coast, leaving a considerable tract of undulating country along the sea-margin.

ENTREMETS, **ENTRÉES**, French terms now generally used to designate certain courses of dishes served at fashionable dinners. The chief dishes are *entrées*, and the lighter dishes are *entremets*.

ENTRENCHMENT. See **FORTIFICATION**.

ENTRERÍOS (the Spanish for *between rivers*) takes its name from its occupying the space between the Parana and the Uruguay. It is one of the states of the Argentine confederation. The area is estimated at 45,000 sq. m. and the population in 1895 at 290,994 inhabitants. The country is almost entirely pastoral—its principal productions being hides, horns, tallow, and jerked beef. The soil is not well fitted for cultivation, for, besides being rather swampy throughout, it is subject, in the south, to annual floods. The capital is Concepcion del Uruguay.

ENTRESOL is a low story between two main stories of a building (generally between the ground floor and the first story), or between two portions of one story, when certain rooms are of greater height than the others upon the same floor. The rooms in the E. are called *entresols* or *mezzanines*.

ENTROP'ION, or **ENTROPION** (Gr. *en*, in, and *trepō*, I turn), inversion of the eyelashes, or even eyelid, consequent either on loss of substance, or on inflammatory swelling of the lid. If confined to one or two eyelashes, they should be plucked out by the roots, and the bulbs should be cauterized; but the radical cure of severe entropion requires a careful adaptation of the surgeon's art to the circumstances of the particular case, and should not be attempted by unskilled hands.

ENTRY, RIGHT OF. In the law of real estate the **right of entry upon lands** is legally held by any one who has the right of possession. It amounts to a peaceable assertion of his title not preceded by an action at law. This right exists where previous entry had

been made by a claimant without lawful title, as where the legal owner had been wrongfully dispossessed. Where the right of entry has been justly exercised the law will sustain him who has made the entry, but where the original entry of the opposing party was on its face lawful, the real owner of the estate must resort to an action at law, and his entry under such circumstances will not give him any better standing in court than he before held, as the supreme court of one of our states has said, "An entry at common law is nothing more than an assertion of title by going on the land. . . . Anciently an actual entry was required to be made, but now nothing of that kind is required." The word entry under the United States statutes relating to public lands denotes, not the actual going upon the land, but the filing of the claim in the records of the land office.

ENVELOPES. Until the introduction of the penny-postage system, E. for written letters were very little adopted; it was far more customary to secure, by wafer or sealing-wax, the sheet of paper on which the letter was written. When the postage was rendered uniform for all distances, and prepayment enforced, or at least recommended, it was supposed that stamped E. would be convenient coverings for letters, sealing the letter and paying the postage at one operation. Such has indeed been the case; but the envelope-manufacture has since taken a new direction, and to an extent that no one could have contemplated. Several large firms in London and elsewhere can make E. more cheaply than the government, and can vary the size, shape, color, and quantity to an indefinite degree; as a consequence, although E. bearing the government impressed stamp are still in demand, the unstamped varieties are used in very much larger quantities. They are made by two methods, involving different amounts of machine-power. The paper is first cut into quadrangular pieces rather longer than wide, by a cutting blade brought to bear upon a pile of sheets at once; and then cutting-dies reduce these pieces to the proper shape, generally lozenge or diamond form, but sometimes with curvilinear edges. For some kinds, it is found to economize both time and paper to stamp the pieces out at once from the rough sheets. The subsequent folding and gumming are performed generally by hand, sometimes by machine. In the hand-method, women and girls fold with almost incredible quickness, having very simple guide-pieces to aid them in giving the proper oblong quadrangular shape to the fold. The gum is applied with a small brush, either along the overlapping edges, or in spots here and there, according to the quality of the envelope.

The envelope-machines, however, such as those of Messrs. De la Rue, are beautiful examples of automatic mechanism. In the kind invented and used by this celebrated firm, a cutting-machine severs the blanks or papers; and dies are employed to stamp the device on the spot where the seal would otherwise lie. The blanks are then fed into the folding-machine, where they pass through a curious series of processes. Each blank is carried down into a box, where a plunger makes four creases in it; two short levers fold down two of the flaps thus made; a gumming apparatus comes up, and applies a line of wet gum to each flap-edge; two small levers then fold down the other two flaps (but only fastening one of them); and finally, the envelope is shifted aside to a pile, and makes way for another. All these processes are gone through in *one second*, enabling the machine to make 60 E. per minute. Where 12 of these machines are working at once, it will be seen that a million E. are put out of hand in a very short time.

ENVOY, a diplomatic minister of the second order, i. e., inferior in rank to an ambassador. Envoys ordinary and extraordinary, ministers plenipotentiary, the inter-nuncios of the pope, and all other inferior diplomatic ministers, differ from ambassadors in this, that although they receive their credentials, like ambassadors, immediately from their sovereign, they represent not his personal dignity, but only his affairs. They stand to him just as an ordinary agent does to his principal, and their acts or promises are his in a business, though not in a personal sense. It is said that this class of diplomatists was first introduced by Louis XI. of France, towards the end of the 15th century. The E. is superior in rank to the chargé d'affaires, whose credentials proceed from the ministers of the state from which he is sent, and are addressed to the minister of the state to which he is sent; or are a mere delegation from an ambassador or E. to conduct the affairs of the mission in his absence. Consuls (q.v.) are not generally reckoned among diplomatic ministers, though, where they have diplomatic duties to perform independently of an ambassador or E., they are accredited, and treated as ministers. According to the division of diplomatic agents into four classes, which was made by the great powers at the congress of Vienna in 1815—viz.: 1. Ambassadors, legates, and nuncios; 2. Envoys, ministers, and other agents accredited to sovereigns; and 3. Chargés d'affaires, accredited by and to the departments of foreign affairs—an E. would be of the second, and a chargé d'affaires of the third rank. But the practice of this country has interjected between the ambassador and the E. a second class, called envoys extraordinary and ministers plenipotentiary, which, of course, throws the ordinary E. into the third, and the chargé d'affaires into the fourth class. See **AMBASSADOR**; **CHARGÉS D'AFFAIRES**; **CONSUL**; **DIPLOMACY**; **EMBASSY**; **MINISTER**.

ENZIO, or **ENTIUS**, 1225-72; king of Sardinia, a natural son of Frederick II. and the beautiful Bianca Lancia; b. at Palermo. He fought by his father's side against the Lombards at the battle of Cortenuova before he was 13 years of age, and the following

year was married to Adelasia, the heiress of Sardinia and Corsica, and given the title of king of Sardinia. In May, 1239, he was declared vicar imperial in northern Italy, and commanded the German and Saracen troops in the imperial army; he entered the March of Ancona, and became so formidable a foe to the papacy, that the distinguished soldier-cardinal, John of Colonna, was sent against him. Gregory IX. excommunicated Frederick and his son before the end of the year; and a crusade against them was preached soon afterwards. In 1241, the command of the fleet having been intrusted to Enzo, he gained a splendid victory over the Genoese, sinking three of their vessels and capturing 19. Amongst the captives were three cardinal-legates, and many bishops and archbishops; the booty included the large sums of money which the notorious cardinal Otho had just collected in England. After the death of the pope (August), Enzo was sent with a large army to aid his brother Conrad, king of the Romans, against the invading Tartar hosts; the victory won by the two brothers near the river Delphos finally delivered Europe from the presence of these desolating hordes. Enzo was afterwards sent into Lombardy, which was for several years the scene of his chief exploits. In 1245, he was again excommunicated by Pope Innocent IV., and in 1247 he besieged Parma, but was forced to retire. He then besieged Colonna, and in 1249 took the castle of Arola, but, on May 26 of the same year, he was taken prisoner at Fossalta by the troops of Bologna and consigned to perpetual imprisonment. "A captive at the age of 24," says Dean Milman, "this youth, of beauty equal to his bravery—the poet, the musician, as well as the most brilliant soldier and consummate captain—pined out 23 years of life, if not in a squalid dungeon, in miserable inactivity."

E'OCENE (*eos*, dawn, and *kainos*, recent), a term introduced by Lyell to characterize the lower tertiary strata, from the idea that the fossil shells of that period contain an extremely small proportion ($3\frac{1}{2}$ per cent.) of living species. He accordingly looks upon these beds as indicating the dawn of the existing state of the testaceous fauna—no recent species having been detected in the older rocks. The gradual approximation of the living inhabitants of the globe to the present forms is the chief characteristic of the E. and newer deposits. The E. beds rest on the chalk. Like the other tertiary strata, these deposits occupy small and detached areas when compared with the older measures. It is not difficult to determine the relative position of primary or secondary strata, because of the great extent of particular beds, being frequently continuous over extensive districts. But tertiary deposits are more isolated, and occur in smaller and more detached patches; hence it is difficult to determine the contemporaneity of the sections of the various periods, occurring as they do in different isolated localities. Their relations must be determined from the petrological structure of the beds, which, however, is very inconstant, or from the more satisfactory evidence derived from their fossiliferous contents.

In the following table are given the generally received divisions of this period, with the maximum thickness (in English ft.) of the English strata, and the French and Belgian equivalent beds:

| | | | |
|----------------------------|-----------------------------|------|--|
| MIDDLE Eocene Eocene | 1. Hampstead series..... | 175 | { Calcaire lacustre supérieur, and Grès de Fontainebleau.—Rupélien. |
| | 2. Bembridge series..... | 115 | { Gypseous series of Montmartre, Calcaire lacustre moyenne, and Calcaire siliceux.—Tongrien. |
| | 3. Osborne series..... | 70 | { Grès des Beauchamp. |
| | 4. Headon series..... | 182 | { Sables moyennes, Calcaire grossier, and Lits coquilleux.—Laeckenien and Bruxellien. |
| | 5. Bagshot series..... | 1270 | { Wanting in France.—Ypresien. |
| MIDDLE Eocene Eocene | 6. London clay series..... | 480 | { Argile plastique et lignite.—Landenien supérieur. |
| | 7. Plastic clay series..... | 160 | { Wanting in France.—Landenien inférieur. |
| | 8. Thanet sands series..... | 90 | |
| Total thickness..... | | 2542 | feet. |

In our own country, the eocene strata extend from New Jersey to the Mississippi River, forming a belt parallel with the Atlantic and Gulf coasts; and in the interior are noted in Wyoming and Idaho; but not upon the western sea-coast. The eastern strata are divided into (1) the Claiborne beds; (2) the Jackson beds, and (3) the Vicksburg beds. They contain fossils in the shape of marine mollusks, fruits, and leaves. In the west, they exhibit the remains of a group of mammalia named by Prof. O. Marsh *dinocerata*, of huge size, horned, and with enormous teeth. The leaves and fruits are thought to indicate an original tropical climate. Some of these have been found in Vermont, and some as far west as the Mississippi. The most recent bed is the Vicksburg.

EOLIAN ACCUMULATIONS. A name applied by geologists to accumulations apparently formed by the action of the winds.

EOLIAN HARP. See **ÆOLIAN HARP.**

EOLIPILE, a hollow metallic ball from which, when heated, steam issues by orifices in two tubes, so as to turn the ball. It was invented by Hero of Alexandria. See **HERO**, **STEAM-ENGINE.**

EOLUS. See **ÆOLUS.**

EON, or **EUDO DE STELLA**, a religious fanatic of Bretagne in the 12th c., who claimed to be the final judge of mankind. He opposed the hierarchy of the church, and taught that the only true baptism was the baptism of the Holy Ghost given by the laying on of hands. He was believed to have miraculous power, and gained many followers. He was opposed publicly by the cardinal-legate Albericus, and in a book by archbishop Hugo of Rouen. Some of his disciples were burned to death for their heresy. In 1148 he was captured, with some of his leading adherents, and tried before the synod at Rheims, but escaped execution because thought insane. After his death his sect soon died out.

EON DE BEAUMONT, **CHARLES GENEVIÈVE LOUIS AUGUSTE ANDRÉ TIMOTHÉE D'**, known as the *Chevalier d'Eon*, was b. at Tonnerre, in Burgundy, in 1728, studied law, and became an advocate. He attracted the notice of the prince of Conti by some political writings; and in 1755 was introduced by the latter to Louis XV., who employed him in diplomatic missions to Russia and Austria. After serving a short time in the army, not without distinction, he was sent to London in 1761 as secretary of embassy, and shortly after was made minister-plenipotentiary. Becoming the victim of a court cabal, however, which deprived him of his office, he took his revenge by publishing his secret correspondence with the French court, which contained, among other things, libels on various persons. For one of these, he was prosecuted in London; and to avoid judgment, fled to the continent. He, however, returned to England again; but, on the death of Louis XV., the French ministry deemed it prudent to recall him, as they were afraid he might betray their secrets to the English government, which made him brilliant offers. The pretext laid hold of for this purpose, was the scandal excited in London by his having assumed the garb of a woman, which he had done at the request of Louis, the better, it may be presumed, to hide his designs as a "secret agent." On his return to France, however, Eon was very favorably received; and Louis XVI. even ordered him to make use of the feminine garb in future. In 1783, he again proceeded to London, not, however, in any visible official capacity; and, though dressed as a woman, gave lessons in fencing, of which art he was a complete master. On the outbreak of the French revolution, he hastened home, and offered his services to the nation; but as nothing came of his offer, he finally returned to London, where he sank into the greatest misery, and d. 21st May, 1810. An examination of Eon's remains by Mr. J. Copeland, a surgeon, settled the question of his sex, and put an end to the curiosity of the English public. His writings appeared at Amsterdam 1775, under the title of *Loisirs du Chevalier d'Eon*. The *Mémoires* which bear his name are not genuine.

EOO'A, or **MIDDLEBURG**, one of the Friendly or Tonga islands, is 30 m. in circuit, and contains 300 inhabitants. It is in lat. 18° 19' s., and long. 175° 37' west. The surface, which is rocky and barren, rises 600 ft. above the sea. The group, as a whole, was discovered by Tasman in 1643.

EOS. See **AURORA**

ÉÖTVÖS, **JOZSEF**, a highly distinguished Hungarian author, was b. 3d Sept., 1813, at Buda; educated at home by a tutor of republican sentiments, and studied philosophy and jurisprudence at the university of Pesth during the years 1825-31. He became an advocate in 1833, but soon resolved to devote himself exclusively to literature, in which field he had already won a great reputation by his comedies *Kritikusok* (The Critics) and *Házasságok* (The Weddings), and also by his tragedy *Boszú* (Revenge). After his return from a journey through Germany, France, England, Switzerland, and the Netherlands, he published his *Prison Reform* (*Gefängnisreform*, Pesth, 1838), which was instrumental in bringing about many wholesome improvements in regard to prisons. This was followed (1838-41) by his novel entitled *The Carthusian*, which excited great interest, and was pronounced to be one of the best productions of Hungarian literature. E. now began to distinguish himself in politics. When the liberal party split, in 1844, into municipalists and centralists, he became one of the most eloquent advocates of the policy of the latter party, and wrote numerous articles in favor of it in the *Pesti Hírlap*, which are marked by varied learning, fullness of thought, and elegance of expression. They were issued in a collected form at Leipsic in 1846, under the title of *Reform*. The *Village Notary* (*A' Falu' Jegyzője*, 3 vols., Pesth, 1844-46; English by Otto Wenckstern, 1850; German by Mailath) is a work of the highest order of merit. For variety of incident, easy vigor of style, humor, liveliness, and freshness of descriptive power, it has been pronounced equal to the best of the *Waverley Novels*. It was followed in 1847-48 by his *Magyarország 1514-ben* (Hungary in 1514), which describes the insurrection of the peasants that happened in that year in a masterly style. When the revolution of 1848 broke out, E. was appointed minister of public instruction, but soon became aware of his own incapacity for the work of a practical statesman, and abandoning his country, which he deemed it impossible for him to serve, retired for some time to Munich, where he employed himself exclusively in literary pursuits. The most important fruit of his residence here was *Der Einfluss der Ideen des 19 Jahrh. auf Staat und Gesellschaft*. In 1851, E. returned to Hungary. In 1859, he published anonymously his *Garantien der Macht und Einheit Oesterreichs*. In 1867, he was appointed minister of worship and education, and in that capacity engaged actively in the work of reform. He d. at Pesth on the 3d of Feb., 1871.

EOZOIC PERIOD. See **ARCHÆAN PERIOD.**

EOZO'ON, supposed by some paleontologists to be one of the oldest geological representatives of animal life, and by others held not to be an animal. It was a huge mass of lower organization than the sponges or protozoa, and belonged (if to animals) to the *Foraminifera*. It was jelly-like, without definite organs, but probably with power to secrete a calcareous shell. Remains have been found in Canadian rocks, whence the name *Eozoon Canadense*. See **LAURENTIAN SYSTEM.**

EPACRIDA CEE, a natural order of exogenous plants, consisting of shrubs and small trees, which, both in appearance and in botanical characters, much resemble the *Ericææ*, or heath family. The most important distinguishing structural character is indeed found in the simplicity of the anthers, which are one-celled, open longitudinally, and are destitute of appendages. The flowers of the E. have generally a tubular corolla, dividing into five—rarely four—segments; which, however, sometimes become separate petals. The calyx is persistent, often colored, has the same number of segments with the corolla, and is surrounded with small bracts. The stamens are fewer than in the *Ericææ*, usually equal in number to the segments of the corolla, and alternate with them. The fruit is sometimes a capsule, sometimes a berry, sometimes a drupe. The leaves are simple, generally alternate, often crowded; the flowers in spikes, in terminal racemes, or axillary and solitary.—About 400 species of E. are known, all natives of the Indian archipelago, the South Sea islands, and Australia; in which regions they seem to occupy the place of the heaths of other parts of the world. Some, particularly of the genus *epacri*, are well-known ornaments of our green-houses, and are flowering shrubs of great beauty. Some produce edible berries resembling the cranberry. See **CRANBERRY.**

E'PACT, in chronology, is the excess of the solar month above the lunar synodical month; or of the solar year above the lunar year of twelve synodical months; or of several solar months above as many synodical months; or of several solar years above as many periods, each consisting of 12 synodical months. The menstrual E. is the excess of the civil calendar month above the lunar month. For a month of 31 days, this E. is 1 day 11 hours 15 minutes 57 seconds, if we suppose new moon to occur on the first day of the month. The annual E. is the excess of the solar year above the lunar. As the Julian solar year is (nearly) 365 days, and the Julian lunar year is (nearly) 354 days, the annual E. is nearly 11 days. The E. for two Julian years is, therefore, nearly 22 days; for three years, 33 days; and so on. When, however, the epact passes 30 days, 30 falls to be deducted from it, as making an intercalary month. For three years, then, the E. is properly 3; and for 4 years, adding 11 days, it is 14 days; and so on. Following the cycle, starting from a new moon on the 1st of Jan., we find that the E. becomes 30 or 0 in the 19th year. The E. for the 20th year is again 11; and so on. The years in the cycle are marked by Roman numerals, I. II. III., etc., called the golden numbers; and a table of the Julian epacts exhibits each year in the cycle with its golden number and epact. As the Gregorian year (see **CALENDAR**) differs from, and is in advance of, the Julian by 11 days (the number lost on the Julian account before the Gregorian computation of time was introduced in England), and as 11 days is the difference between the solar and lunar years, it follows that the Gregorian E. for any year is the same with the Julian E. for the year preceding it.

EPAMINON DAS, the most eminent of Theban generals and statesmen, and one who for a long period elevated his country to the highest point of honor and prosperity, was b. 414 B. C. He was descended from an ancient but impoverished family, and led a retired life till his 40th year, profiting by the instructions of Lysis the Pythagorean, who inspired him with enthusiasm for the elevated ideas which it was the object of his life to realize. E. first becomes prominent during the period when the Lacedæmonians garrisoned the citadel of Thebes, and kept the inhabitants in subjection. Though he took no part in the desperate but successful stratagem by which his fellow-citizens recovered the *Cadmeia* in 379 B. C., he stepped forward immediately after into the ranks of the patriots; and when sent to Sparta in 371 B. C., along with several others, in order to negotiate a peace between the two countries, E. displayed as much firmness and dignity as eloquence in the debate which ensued upon the question whether Thebes should ratify the treaty in the name of all Bœotia, the result of which ratification would have been equivalent to a recognition of her claim to supremacy over the Bœotian towns. To this the Lacedæmonians demurred, and the war was again resumed; E. was appointed commander-in-chief; and, in conjunction with his friend Pelopidas, with an army of 6,000 men, defeated double that number of the enemy at Leuctra (371 B. C.). Two years later, he and Pelopidas marched into the Peloponnesus, incited several of the allied tribes to fall away from Sparta, and then turned his arms against that city, which, however, was bravely defended by Agesilaus. On his return to Thebes, E. was accused of having violated the laws of his country, by retaining the supreme power in his hands beyond the time appointed by law; but was acquitted in consequence of his open and animated defense. In the spring of 368 B. C., the war was renewed with increased fury between Thebes and Sparta, and E. once more marched into the Peloponnesus, but did not accomplish much; and on his return home, received a check from Chabrias at Corinth. To atone for this unsuccessful undertaking, he advanced with 33,000 men into Arcadia,

and joined battle with the main body of the enemy near Mantinea, in the year 362 B.C. E., at the head of his troops, succeeded in breaking the Spartan phalanx, but was mortally wounded in the breast by a javelin. Being told by the physicians that he would die as soon as the weapon was extracted, on receiving intelligence that the Bœotians had gained the victory, he is said to have torn out the javelin with his own hand, exclaiming: "I have lived long enough." His moral purity, justice, and clemency are extolled by the ancients as much as his military talents; and it is expressly recorded of him, that he never told a lie, even in jest. Compare Bauch, *Epaminondas und Thebens Kampf um die Hegemonie* (Breslau, 1834); Pomtow, *Das Leben des E.* (1870).

EPANADIPLOSIS. See RHETORIC, FIGURES OF.

EPANALEPSIS. See SYNTAX, FIGURES OF.

EPANASTROPHE. See SYNTAX, FIGURES OF.

EPANOME'RIA, a town in Santorini, one of the Grecian islands, built on a steep promontory, so that the houses are ranged in terraces one row above another to the number of 15 or 20. Some are excavations in the rock, and the lowest are 400 ft. above the sea. The place is reached by a winding pathway cut in the face of the cliff, on the summit of which are many windmills.

EPANORTHOSIS. See RHETORIC, FIGURES OF.

EP'ARCH, the governor of a province in ancient Greece, or prefect of a region under the rule of Rome. In modern Greece a province of the kingdom is called a nomarchy, and a subdivision of a nomarchy an eparchy. In Russia the term has an ecclesiastical use, denoting the diocese or archdiocese of a bishop or archbishop.

EPAULEMENT (from the French *épaule*, shoulder), in siege-works, is a portion of a battery or earthwork. The siege-batteries are generally shielded, at one end at least, by epaulements, forming an obtuse angle with the main line of the battery. The object is to protect the guns and gunners from a flanking fire. The name is often given erroneously to the parapet of the battery itself, but it applies properly to the flanking return only. Sometimes the whole of a small or secondary earth-work, including the battery and its flanks, is called an E.; and sometimes the same name is given to an isolated breast-work intended to shield the cavalry employed in defending a body of besiegers.

An *épaule* is the shoulder of a bastion, where one of the faces and one of the flanks meet; and this points to the proper meaning of E., as a shoulder or flanking work.

EP'AULET, from the same French source as epaulement, is a shoulder-knot worn by commissioned officers in the naval profession, both as an ornament and a distinction. In the British navy, the officers of and above the rank of lieutenant wear epaulets of gold lace, one on each shoulder, sub-lieutenants wearing one only. Ranks and degrees are marked in a very systematic way by means of crowns, anchors, and stars worked in silver on the E., and also by the size of the cords of the E. itself. This decoration was formerly universal in the British army, officers wearing those of gold, men of worsted; but they were abolished during the Russian war, in consequence of the danger to which officers thus easily marked out were exposed. It is retained by the French army alone of the armies of the great powers.

EPÉE, CHARLES MICHEL, ABBÉ DE L', one of the founders of the system of instruction for the deaf and dumb, was b. at Versailles, 25th Nov., 1712. He studied for the church, and entering into holy orders, became a preacher and canon at Troyes, but eventually, on account of his Jansenist opinions, was deprived of this appointment. He now lived in retirement in Paris. In the year 1755, he first began to occupy himself with the education of two deaf and dumb sisters; and, as he asserts, without any previous knowledge of Pereira's efforts in the cause, invented a language of signs, by which persons thus afflicted might be enabled to hold intercourse with their fellow-creatures. His first attempt being crowned with success, he determined to devote his life to the subject. At his own expense, he founded an institution for the deaf and dumb, and labored with unwearied zeal for its prosperity. His favorite wish, however, the foundation of such an institution at the public cost, was not fulfilled till after his death, which took place 23d Dec., 1789. He wrote a work, entitled *Institution des Sourds et Muets* (2 vols., Paris, 1774), which afterwards appeared in an improved form under the title, *La Véritable Manière d'Instruire les Sourds et Muets* (Paris, 1784).

EPEI'RA, a genus of spiders, the type of a family called *epeiridae*. They are of those spiders which have only a pair of pulmonary sacs and spiracles; construct webs with regular meshes, formed by concentric circles and straight radii; and are furnished with a pair of almost contiguous eyes on each side, other four eyes forming a quadrangle in the center. Many of them are remarkable for the beauty of their colors and of their forms. Several species abound in our gardens, particularly in autumn. *E. diadema* is one of the largest British spiders. It is found in moors, the borders of woods, etc.; but it is in tropical countries that the *epeiridae* exist in greatest numbers, and attain the greatest size and beauty, extending from branch to branch their lace-work, remarkable for gracefulness of design. The net, when loaded with wings, wing-covers, and limbs of insects that have been preyed upon, is often loosened, and falls down upon the central nest or den of the spider; and successive nets thus falling down, form at last a ball sometimes as large as a man's head. Some of the spider cords, carried horizontally

from tree to tree at a considerable height from the ground, "are so strong as to cause a painful check across his face when moving quickly against them; and more than once," Sir J. E. Tennent says, "in riding I have had my hat lifted off my head by a single thread."—Tennent's *Ceylon*.

ÉPERGNE. (Fr., derivation uncertain.) A term applied to an ornamental piece intended for the centre of a dinner table. It is sometimes merely ornamental, as a group of figures; but when complete it has one or more receptacles which are detachable, and serve to contain flowers, fruits, bonbons, and other articles of dessert. It varies in design, and is sometimes in the form of a standard, diminishing in size toward the top, or it may be of a low design. Épergnes are usually of silver or glass, but may be of gilt or bronze.

EPERÏES (Lat. *Fragopolis* or *Eperesinum*; Hung. *Eperjes*, Slovak *Pressova*), an old t. of Hungary, in the co. of Saros, of which it is the capital, is agreeably situated on the left bank of the Tarcza, about 150 m. n.e. of Pesth. It is surrounded with walls, is the seat of a bishop, and contains some houses of the 15th and 16th centuries, built in the style of those in Naples, with which E. was much connected in the middle ages. Its principal buildings are the church of St. Nicholas, the communal college, with 500 students and a library consisting of 14,000 volumes, and the county hall. It has manufactures of earthenware and of linens and woollens, and has some trade in linen goods, corn, and Tokay wine. In the vicinity are the Sovar saltworks, which produce 5,000 tons of salt annually. Pop. in '80, 10,139, almost wholly Slavonic.

EPERNAY, a t. of France, in the department of Marne, is the headquarters of the *vins de Champagne*, and is situated in the midst of a rich vine-growing district, on the left bank of the Marne, 19 m. w.n.w. of Chalons. It is well built, clean, and well paved. Its environs consist, for the most part, of elegant villas, with vaults attached, belonging to the Champagne wine-merchants. E. manufactures large quantities of earthenware from a clay obtained in the neighborhood, and called *terre de Champagne*; also hosiery, refined sugar, and leather. It has a brisk trade in bottles, corks, wire, Champagne wines, etc. Pop. of commune '91, 18,361.

EPHAH, a measure of capacity for dry goods in use among the Hebrews. It contained three English pecks and three pints.

EPHEMERA (Gr. lasting for a day), a Linnæan genus of neuropterous insects, now forming the family or tribe *ephemeridæ*. They are allied to the *libellulidæ*, or dragon-flies, but differ from them in many very important respects. They have received their name, to which corresponds the English DAY-FLY, sometimes also applied to them, from the brief duration of their existence in the perfect state, in which, very unlike the dragon-flies, they are believed to take no food, merely propagating their species, and dying. From the season of the year in which they begin to be seen, some of them are also called MAY-FLY; and by this name are well known to anglers, who use them, and artificially imitate them as excellent lures for trout. The eggs of the ephemera are also a favorite food of fishes; they cohere together in a gelatinous mass. The larvæ and pupæ are aquatic, and in these states the ephemera have a much longer life than in their perfect state, extending even to years. The larvæ and pupæ are sufficiently voracious. The abdomen of the larva is furnished on each side with a set of leaflets, which serve instead of gills for respiration, and are also used in locomotion, although there are 6 ft. attached to the thoracic segments. The pupæ differ little from the larvæ except in having rudimentary wings inclosed under scales. Both larvæ and pupæ have the abdomen terminated by two or three jointed filaments, which the perfect insect also has, sometimes very long. The body of the perfect insect is soft and slender; the wings resemble in form those of dragon-flies, but are soft and filmy; in repose, they are elevated vertically above the body; the second pair of wings are much smaller than the first, and in some species are altogether wanting; the organs of the mouth are so soft and small as not easily to be discerned, and to be apparently unfit for any kind of use. Ephemera, in their larva and pupa states, live chiefly under stones in water, or in burrows which they make in the banks of streams. When ready for their final change, they creep out of the water to undergo it on some plant or other object by the water-side, generally towards sunset on some fine day of summer or autumn. After having attained their winged state, however, they cast off a complete slough or envelope, so perfect, that it exhibits even the limbs, abdominal filaments, and antennæ; and these "ghost-like exuvie" are sometimes so abundant in the neighborhood of streams, as to cover in "a pearly layer" the hat and basket of the angler. The multitudes of ephemera are often very great, filling the air as a cloud; nay, so abundant are they at times, that their bodies have been known to cover the ground in certain districts of France, and have been gathered in cart-loads to be used as manure. See illus., BEETLES, ETC., vol. II., p. 386, fig. 19.

EPHEMERA, or FEBRIS DIARIA in Latin (from Gr. *epi* and *hemera*, on a day), a fever which lasts only a single day, or part of a day, and is generally dependent on some slight local irritation. It hardly requires any other treatment than the removal of the cause, if known.

EPHEMERIS (Gr. "for the day") is a name applied to almanacs from their containing notices for each day. It is mostly confined to astronomical tables giving the daily

places of the sun, moon, and planets, and other phenomena of the heavens. Such tables have become common since the days of Kepler. The first were published by Purbach for the years 1450-61. Those of Regiomontanus, for 1474, were much more accurate, and his ephemerides met with universal acceptance. Similar publications were afterwards made by Leovitius, Origanus, Kepler, and others. The most important works of the kind at present are the French *Connaissance des Temps*, the English *Nautical Almanac*, the Berlin *Astronomisches Jahrbuch*, and the *American Ephemeris and Nautical Almanac*.

EPHESIANS, EPISTLE TO THE, is now universally admitted to have been written by the apostle Paul. It is expressly ascribed to him by Ignatius (if indeed any writings attributed to him are genuine), who was contemporary with Paul; is alluded to by Polycarp, a friend of the apostle John, and cited by Irenæus, Clement of Alexandria, Tertullian, Origen, and many subsequent writers. Some critics have maintained that it was not addressed to the Ephesians, but either to the Laodiceans or to several churches in common, of which Ephesus may have been one. The reasons which they assign for this opinion are: 1. That Marcion, a heretical writer of the 2d c., asserts that in his copy of the epistle the reading was "in Laodicea," and not "in Ephesus." The answer to this is that Marcion is known to have altered the text in other instances to suit his own views, he is not to be trusted, especially when all known ancient manuscripts and all ancient versions read "in Ephesus." 2. That as Paul directed the Colossians to read the epistle from Laodicea, he must have written an epistle to Laodicea, which is either this so-called epistle to Ephesus or else has been lost. To this the answers are: (1) If he did write to Laodicea, it may have been a letter designed for local and temporary use only. As Christ said and did many things which he did not design to have recorded in the small book of the New Testament, why may not an apostle have written some things which were not to have a place there? (2) Paul charged the Colossians to let the epistle which he sent them be read by the Laodiceans; but why would he have wished this so earnestly if at the same time he had written to Laodicea this "epistle to the Ephesians" (which so greatly resembles that to the Colossians), and had intrusted both to the same messenger to be delivered at about the same time? (3.) It is said that if the epistle had been written to the Ephesians, among whom Paul had spent three years of most loving and successful ministry, it could not have been so general in its style, and would have contained personal salutations at the close. To this the answers are: (1) This epistle and that to the Colossians, written at the same time, both show that Paul's thoughts were intent on Colosse, Laodicea, Hierapolis, those whom he had never seen, the Gentiles at large, and God's eternal purpose with reference to them all. In all that he then wrote, therefore, themes of general and permanent interest might naturally prevail to the exclusion of personal and transient things. (2) At the close of the epistle he expressly says that he has committed all matters of a personal nature between himself and his readers to the beloved and faithful brother who was the bearer of the epistle, and whom he sent to them for the very purpose of making them acquainted with his condition and of comforting their hearts. Such provision having been made for loving salutations and all other particulars which his former relations to the Ephesians would prompt, the entire absence of them from the epistle itself is explained.

The doctrinal part of the epistle contains thanksgiving to God for the revelation of his eternal purpose of grace to men; prayer that Christians may receive the full measure of the blessings provided for them; the native character of mankind as dead in sins; regeneration by the grace of God, and the benefits, present and future, resulting from it; salvation by divine grace and not by human works; good works the fruit of regeneration; privileges resulting from the reception of salvation by grace; statement of God's purpose to receive the Gentiles among his people; repeated prayer that Christians may receive the fullness of the blessings provided for them; renewed ascriptions of perpetual glory to God in the salvation of men. The practical part consists of exhortations to Christian unity, progress in the new life, general holiness of conduct and heart, the particular virtues of truthfulness, self-control, honesty, purity in words and deeds, sobriety, cheerfulness, fidelity in the relations of wives and husbands, children and parents, servants and masters, and strenuous maintenance of the spiritual warfare, by strength to be obtained from God and under the protection of the armor which he provides.

EPHESUS, one of the twelve Ionic cities of Asia Minor, was situated in Lydia, near the mouth of the river Caystrus, in the midst of an alluvial plain. It does not appear to have been as old as the Trojan war, but its primitive history has been confused by myths. It bore a great variety of names at different times, the principal of which, besides E., were Ortygia and Ptelea. According to Strabo, it was founded by Androclus, son of Codrus, and this is the most probable of the accounts which have come down to us, though others held to the tradition of its Amazonian origin. It was long before E. acquired any political importance, in spite of being a sacred city from an early period. Subdued first by the Lydian, and next by the Persian kings, it was

included, after the death of Alexander the Great, in the territories of Lysimachus (281 B.C.), by whom it was greatly strengthened. Ultimately, it came into the possession of the Romans; and in the time of Augustus, when Strabo wrote, it was "the greatest place of trade of all the cities of Asia w. of the Taurus." This was also its condition when visited by St. Paul, who resided here three years; but the destruction of its great temple by the Goths, in 260 A.D., gave it a blow from which it never recovered. In 341, A.D., it was the scene of the *third* general council of the Christian church. Its general history, while a city of the Byzantine empire, was unimportant, and before the days of Tamerlane it had almost completely perished.—The ruins of E. comprise a stadium 687 ft. long, fragments of a great theater (alluded to in the account of St. Paul's preaching in the city), of an odeum or music-hall, and of various walls and towers, belonging to the Greek, Roman, and Byzantine eras. Near the western extremity of the town are also some massive structures, which have since 1868 been carefully excavated, sometimes from beneath 18 ft. of soil. It is now certain that these stand on the site of the famous *temple of Diana*. This marvelous building, one of the seven wonders of the world, was originally built by Chersiphron; but after its destruction by Herostratus on the night (as is said) when Alexander the Great was born (356 B.C.), it was rebuilt by the inhabitants in a style of greater splendor than before, the very women contributing their ornaments to secure the necessary funds; yet, notwithstanding this enthusiasm, more than 200 years elapsed before the new edifice was completely finished. It was the largest Greek temple ever constructed. Its length was 425 ft., its width 220, the number of its columns 128, of which 36 were carved, and their height 60 feet. It had an area more than four times that of the Parthenon at Athens, and even the Olympeum was only about two thirds as great. But even more wonderful than the temple itself were the numberless statues and pictures which it contained, executed by the best masters of Greece. The altar of the goddess was principally adorned with the works of Praxiteles. Plundered of its treasures by Nero, and burned (as has been mentioned) by the Goths, it was most likely finally destroyed by the iconoclasts, in the reign of Theodosius I., who issued his celebrated edict against the ceremonies of the pagan religion 381 A.D. The site of E. is now occupied by some wretched villages, the principal of which is Ayasaluk.—Certain cabalistic words or sayings are said to have been inscribed on the figure of Diana, which being copied and carried about as charms, became known as *Éphesæ litoræ* (Mason's *Anatomie of Sorcerie*, 1612).

EPHOD, a vestment worn by the Jewish high-priest over the *mêil* or second (purple) tunic. It consisted of two shoulder-pieces, one covering the back, the other the breast and upper part of the body, not unlike the Greek *epônīs*. Two onyx stones set in gold fastened it on the shoulders, and on each of the stones were engraved the names of six tribes, according to their order. The material of which the E. was wrought was extremely costly and magnificent: "gold, blue, purple, crimson, and fine twined linen." A girdle or band, of one piece with the E., fastened it round the body. Just above this girdle, in the middle of the E., and joined to it by little gold chains, rings, and strings, rested the square oracular breast-plate with the mysterious *Urim and Thummim*. See also **HIGH-PRIEST** and **URIM AND THUMMIM**.

Originally intended to be worn by the high-priest exclusively, ephods of an inferior material seem to have been in common use in later times by the ordinary priests. Even David, when bringing the ark back to Jerusalem, appeared in one. There is also mention made of an E. in several passages of the books of Judges and Samuel, where the word must needs stand either for the *whole* priestly apparatus of an illegal service, or simply for a statue or an idol. The Talmud understands this E. to have been a colossal shoulder vestment of gold, to which divine honors were rendered.

EPHORI (Gr. "overseers"), an order of magistrates in ancient times which appears to have originated at Sparta, and to have been peculiar to the Doric governments. When or by whom the E. were first instituted, is a point of great uncertainty. Herodotus attributes their creation to Lycurgus, and Aristotle to Theopompus (770–720 B.C.). Their duty was to superintend the internal administration of the state, especially affairs of justice, for which a particular building was assigned them, called the Ephorion. One of their most important functions was the oversight, at least in part, of the education of youth, for we are told by Athenæus that they inspected the clothing and bedding of the young men. The E. were five in number; they were elected by and from the people—on which Aristotle observes, that through them the *demos* enjoyed a participation in the highest magistracy of the state—and held their office only for one year. Their influence gradually increased, for their powers were so ill defined that it was difficult to say what was *not* under their cognizance and authority. Cicero draws a comparison between the ephoralty of Sparta and the tribunate of Rome, which is not altogether unwarranted by the facts of the case. Ultimately, the kings themselves became subject to the supervision of the ephori. Cleomenes, for example, was brought before them for bribery; Agesilaus was fined, and Pausanius imprisoned; and in extreme cases they could prefer charges against them, and have them tried before the supreme criminal court. They also transacted the negotiations with foreign powers, subscribed treaties, raised troops, "intrusted the army to the king or some other general," and, in fact, acted as the executive of the state. Muller regards the ephoralty as "the principle

of change in the Spartan constitution, and, in the end, the cause of its dissolution." In the hands of the E., the constitution of Sparta certainly ceased to be a genuine aristocracy, and became a sort of oligarchy; but this point is involved in much obscurity and perplexity. Their authority, however, was at last destroyed by Agis and Cleomenes, who murdered the E. for the time being, and restored the old Spartan constitution (225 B.C.).

EPHRAEM SYRUS, one of the most celebrated and prolific ecclesiastical writers of the Syrian church. Several accounts of his life have been handed down to us, but they all bear more or less such a legendary character, that the real facts to be gathered from them are but scanty. It appears, then, that Ephraem (Heb. *Ephraim*) was born in the early part of the reign of Constantine the Great, "somewhere between the Euphrates and Tigris," most probably at Nisibis. His parents were, according to some, heathens; and Ephraem, repudiating their idolatry at an early age, had to leave their roof. Jacob, bishop of Nisibis, took care of the boy, and undertook his education. His progress in learning was so satisfactory that the bishop was soon able to make him teacher at his own school; and when in 325 A.D. Jacob went to the council of Nicaea, Ephraem accompanied him thither. In 363, Nisibis was ceded by Jovinian to the Persians, and Ephraem first retired into Roman territory, then went to Anid, his mother's birthplace, and finally settled in Edessa (Orfa), where he remained until his death. He is said to have been so poor when he first arrived at Edessa, that he was obliged to take service at a public bath, but he soon became acquainted with hermits of the neighborhood, and adopted their habits; he retired into a cave near the town, and led the life of a recluse. But so great were his piety and asceticism, as well as his readiness to help the poor and tend the sick, that he was looked upon as a saint, and his day is still celebrated, at different dates, in various churches. Among his usual denominations, more especially referring to his teachings and writings, are "Prophet of the Syrians, Column of the church, Harp of the Holy Spirit," etc.; and his name is never mentioned without the "Mor" or "Mari" (Lord, My Master) being prefixed. But for all that, he had no lack of enemies. His burning zeal for preaching and converting led him to attack most fiercely almost every one beyond the pale of his peculiar creed. He spoke and wrote unceasingly against Idolaters, "Chaldees," Jews, and heretics of all kinds, especially Arians, Sabellians, Manichæans, Novatians, etc. Towards the end of his life, he paid a visit to Basil the great, in Cappadocian Cæsarea, who could not prevail upon him to accept of any higher office in the church than a deanery, though he spared no effort to make him bishop. Returned to Edessa, he found plague and famine raging there, and to his exertions for the relief of the sufferers his death is attributed by some. He expired in the same year with Basil, in 373, not before having given the strictest injunctions that his burial should be of the very simplest description. With respect to the Testament which he is reported to have dictated in his dying hour—much as it has been used for biographical purposes—we can take no notice whatever of it, as it is entirely spurious.

The visit to Basilus, unimportant as it seems, has been of very great moment. The legend which surrounds this, as all other incidents of his life, with a halo of miracle, records that the two men, although previously ignorant of each other's language, began to speak them fluently at this interview—Basilus Syriac, and E. Greek. This wonderful circumstance first induced the learned to enter upon the question, whether E., half of whose voluminous works are in Greek, did really understand that language; and further, whether he understood any language but his own, Syriac. If he did not, what view was to be taken of his commentaries on the Bible, of which the Hebrew and Greek texts, as well as the Septuagint and the Greek fathers, must have been a sealed book to him. There were, and are still, great differences of opinion on these points, but it is generally taken for granted now, that he did not understand any language but his own; that he made use of the common Syriac version, the Peshito; that his grammatical and linguistic notes are taken from different Syriac commentaries, and that the Greek portion of his works consists partly of translations made from his Syriac after his death, or even during his lifetime, and partly of interpolations. Both the praise and the blame which have been indiscriminately bestowed upon him as a writer are exaggerated. His chief merit lies in the glowing fervor and the deep piety which he infused into all he wrote, more particularly into his elegiac hymns. Diction and form are poetical throughout, and when not soaring into the infinite, of no mean beauty. The effect is heightened by the matchless simplicity and awing grandeur of the Syriac idiom.

We will now enumerate his principal works and their editions. Those (under his name) in Greek, consist of sermons or homilies, and treatises of an exegetic, dogmatic, and ascetic nature. Photius records that he wrote more than a thousand such sermons; Sozomenos speaks of "300 myriads;" but, as we said before, of those that have come down to us, some are spurious, and others at least suspicious. Gerhard Vossius translated 171 treatises from Greek MSS. found in Italian libraries, into Latin, and published them at Rome, 1589-98, in 3 vols. (There is but one piece in them translated from the Syriac.) They were reprinted in Cologne in 1603, 1619 (1675), and also in Antwerp, in 1619. The first Greek edition appeared in Oxford in 1709, edited from 28 Oxford MSS., by E. Thwaites. The most important of his Syriac works are, besides an infinite variety of homilies, sermons, poems, etc., his commentaries, or rather scholia, on parts

of the Old Testament. Their value to us, however, is limited to their aiding us in explaining and fixing some readings of the Peshito (see PESHITO), and in enriching our critical apparatus. That he also commented on the Gospels is certain, but no MS. has been found as yet, not even in a Greek or Arabic translation. As to the songs and prayers in the Syrian liturgy ascribed to E., they are simply composed in his manner, and betray their comparatively recent origin at the first glance. The principal edition of his works in Syriac and Greek was published in 6 vols. in Rome, under the papal authority (1732-1746).

The principal writers on E. are: Sozomenos, *Hist. Eccl.*, iii. 16; Assemani, *Proleg. and Biblioth. Orient.*; Credner, *De Proph. Min. Vers. Syr.* (1827); Lengerke, *Comm. de Ephr. Syr. S. S. Interprete* (Halle, 1828); and *De Ephr. Syr. Arte Hermen.*, etc. (1831). Some tasteful German translations of hymns, by Zingerle, are to be found in the *Zeitschr. d. Deutschen Morgenl. Gesellsch.*, *passim*.

EPHRAÏM, the younger son of Joseph by his wife Asenath, and the founder of one of the twelve tribes of Israel. It is possible that he may have received his name, which signifies "double fruitfulness," from having been born during the seven years of plenty. His grandfather, Jacob, shortly before his death, prophesied the greatness of his posterity when giving him his blessing: "His seed shall become a multitude of nations" (Gen. xlviii. 19). After the Israelites had left Egypt, the tribe of Ephraim numbered 40,500 (Numbers i. 32, 33); but from causes not specified, and not discoverable, it had sunk, 40 years later, on the eve of the conquest of Canaan, to 32,500 (Numbers xxvi. 37). Yet it was under the leadership of an Ephraimite, Joshua, the son of Nun, that the Canaanites were subjugated, and the land possessed. This seems to have given the tribe a much higher influence than might have been expected from its numerical strength. We find Judah and Ephraim classed together as taking their inheritance first (Josh. xv. xvi., etc.). The precise boundaries of Ephraim, as of the other tribes, it is impossible to determine. It occupied the center of Palestine, was bounded on the s. by Dan and Benjamin, and stretched from the Jordan on the e. to the Mediterranean on the west. From scattered notices of the Ephraimites in the earlier annals of the Hebrews, we infer that they were, on the whole, jealous of their brethren. This feeling of dissatisfaction at length broke out into rebellion in the reign of Rehoboam, and the new kingdom of Israel, ruled over by Jeroboam, was for the most part merely the kingdom of Ephraim, for the land which lay to the n. of it could hardly be said to be actually in the possession of the tribes whose names it bore, the original inhabitants keeping stubborn hold of their cities and strongholds. See the article **JEWS**.

EPI, or **GIROUETTE** (Fr.), a species of ornamental ironwork with which the cones of pavilions or pointed roofs are sometimes surmounted in the renaissance style of architecture. One of the finest examples is that which surmounts the Tourelle aux Pastorals at the hôtel de Bourgheroulde in Rouen.

EPICHRMUS, a famous Greek poet, was b. in the island of Cos, in the 5th c. B.C. At first, he studied philosophy under Pythagoras; but a residence at Megara, the native soil of comedy, gave him a taste for that branch of the drama. After the destruction of Megara, in 484 B.C., he removed to Syracuse, where, at the court of Hiero, he spent the remainder of his life. From this circumstance, he is often mentioned by the ancients as a Sicilian. Almost nothing else is known of his personal history except that he died at the age of 90, or as some say, of 97. The date of his death, as of his birth, is unknown. E. is called by Theocritus the father of comedy, and Plato assigns to him a place among comic writers as high as that of Homer among epic poets. He certainly did a good service in excluding, to a large extent, from his dramas the vulgar buffoonery which disgraced all previous comedies, and in introducing a regular plot in which the *comus* or band of revelers sustained the dialogue. None of E.'s works survive entire; but we possess several fragments and the titles of thirty-five. They embraced a wide variety of topics, mythological, social, and political. From one of them, Plautus borrowed the plot of his *Menachmi*, which shows a great amount of constructive skill. The fragments of E. have been collected and edited by H. P. Krusemann (Haarlem, 1834). Compare Lorenz, *Leben u. Schriften des E.* (1864), and Guigniant, *Histoire del a Comédie Antique* (1863).

EPIC POETRY (Gr. *epos*, a word, a discourse, or narrative). The two chief kinds of poetry are E. P. and lyric poetry. E. P. has outward objects for its subject, of which it gives an imaginative narrative. The events themselves may be partly real and partly fictitious, or they may be altogether fictitious. Lyric poetry, on the other hand, sets forth the inward occurrences of the writer or speaker's own mind—his feelings and reflections. No composition, perhaps, answers, in all its parts, to the one of these descriptions, or to the other; but a piece or poem is classed as epic or lyric according to the element that predominates. Under each of these grand divisions, or genera, there are subdivisions, or species. The longer poems of the epic genus embrace an extensive series of events, and the actions of numerous personages. The term *heroic epic*, or *heroic poem*, is properly applied to such works as the *Iliad* and *Odyssey* of Homer, Virgil's *Æneid*, Tasso's *Jerusalem Delivered*, Ariosto's *Orlando Furioso*, and others, which describe the achievements of the gods and heroes of antiquity, or of the little less mythic knights of mediæval chivalry. Poems, again, like Milton's *Paradise Lost* and Dante's

Divina Commedia, are sacred epics. Byron's *Childe Harold*, with the length and narrative structure of an epic, abounds in reflection, sentiment, and satire, and thus is, in substance, as much lyric as epic. Productions like those now named, formed the class of grand epics, or epic poems, by way of eminence. But there are several species of minor poems which, from their nature, must also be ranked as epics. One of these is the *Idyl*, a term applied to what is called *pastoral poetry*, or to descriptions in general of natural scenery, and of the actions and manners of men in calm, ordinary life. Burns' *Cotter's Saturday Night*, Goldsmith's *Deserted Village*, and most of Crabbe's poems, are idyls; so are poetical epistles. The *ballad* (q. v.) is another species of minor epic.

Attempts at epic poetry are now rare, the spirit of the age being against that form of composition. Instead of epic poems, we have *novels*, which, so far as subject is concerned, may be considered as the epics of modern civil and domestic life.

EPICTE TUS, a celebrated disciple of the Stoa, was born at Hierapolis, in Phrygia, about fifty years after the birth of Christ. He was at first the slave of Epaphroditus, a freedman of Nero, at Rome, whose abusive treatment he is said to have endured with the composure characteristic of the set to which he belonged. He was afterwards manumitted, and devoted himself to the Stoic philosophy. Domitian hated him on account of his principles, and banished him, along with several other philosophers, from Rome. E. settled at Nikopolis, in Epirus. Under the pressure of the times in which he lived, his serious moral views received a character rather of self-denial than of energy; to renounce, to endure, and not to set the mind upon anything beyond the power of the individual to attain, being the points chiefly insisted on. His pupil, Arrianus, collected the maxims of E. in the work entitled *Encheiridion* ("handbook") and in eight books of commentaries, four of which are lost. The peculiar excellence of the writings of E. consists in their simple and noble earnestness. The real heartfelt love of good and hatred of evil which we are in the habit of supposing an exclusively Christian feeling, does manifest itself very finely and beautifully in these, yet, as prof. Brandis says, "there is not a trace in the *Epictetea* to show that he was acquainted with Christianity, and still less that he had adopted Christianity, either in part or entirely." Some of his opinions, moreover, are essentially Christian in their nature, though, of course, they are unconnected with the facts of revelation. E. believes in our "resemblance" to God, in our "relationship" to him, and in our "union" with him through the coincidence of the "will" and the "soul;" he recognizes the contest between good and evil, the life-struggle in the heart, the divine life against which the law in the members wars; and he affirms the necessity of "invoking God's assistance in the strife," that the inner life may become pure as God is pure. There are several good editions of the works of E., the most complete of which is that of Schweighäuser (Leip. 1800).

EPICU RUS, AND EPICURE ANISM. Epicurus, an illustrious Greek philosopher, was b. in the island of Samos, 341 B.C., seven years after the death of Plato. His father, Neocles, is said to have been a schoolmaster, and his mother, Chærestrate, to have practiced arts of magic. At the age of 18, he repaired to Athens, where it has been supposed that he may have had for his teacher Xenocrates or Theophrastus, or perhaps both, but he himself used to declare that he was self-taught. Of the older philosophers, he was most attached to Anaxagoras and Democritus, his system of physics being evidently built upon the atomic speculations of the latter. E.'s stay at Athens on this occasion was short. At Mitylene, in his thirty-second year, he first opened a school; and there and at Lampsacus he taught for five years. In 306 B.C., he returned to Athens, and established a school of philosophy in a garden which he purchased and laid out for the purpose. From this circumstance, his followers were called the "philosophers of the garden." Although E. laid down the doctrine, that *pleasure* is the chief good, the life that he and his friends led was one of the greatest temperance and simplicity. They were content, we are told, with a small cup of light wine, and all the rest of their drink was water; and an inscription over the gate promised to those who might wish to enter no better fare than barley-cakes and water. The chastity of E. was so incontestable, that Chrysippus, one of his principal opponents, in order to deprive him of all merit on the score of it, ascribed it to his being without passions. The calumnies which the Stoics circulated concerning him are undeserving of notice, and were at no time generally believed. E.'s success as a teacher was signal; great numbers flocked to his school from all parts of Greece, and from Asia Minor, most of whom became warmly attached to their master, as well as to his doctrines, for E. seems to have been characterized not less by amiability and benevolence than by force of intellect. He died 270 B.C., in the seventy-second year of his age.

E. was a most voluminous writer. According to Diogenes Laertius, he left 300 volumes. Among others, he had 37 books on natural philosophy, a treatise on atoms and the vacuum; one on love; one on choice and avoidance; another on the chief good; four essays on lives; one on sight; one on touch; another on images; another on justice and the other virtues, etc. Almost all these works are lost: the only writings of E. that have come down to us are three letters, and a number of detached sentences or sayings, preserved by Diogenes Laertius, in his life of the philosopher. The principal sources of our knowledge of the doctrines of E., besides the above letters, etc., are Cicero, Sen-

æca, and, above all, Lucretius, whose great poem, *De Rerum Natura*, contains substantially the Epicurean philosophy.

Although the majority of E.'s writings referred to *natural* philosophy, yet he was not a *physicist*, properly speaking. He studied nature with a *moral* rather than with a *scientific* design. According to him, the great evil that afflicted men—the incubus on human happiness—was FEAR; fear of the gods and fear of death. To get rid of these two fears, was the ultimate aim of all his speculations on nature.

The following is a brief account of his views. E. regarded the universe (*Tò Pân*) as corporeal, and as infinite in extent, and eternal in duration. He recognized two kinds of existence—that of bodies, and that of *vacuum*, or space, or the intangible nature. Of his bodies, some are compounds, and some atoms or indivisible elements, out of which the compounds are formed. The world, as we now see it, is produced by the collision and whirling together of these atoms. He also held the doctrine of perception by *images* (Gr. *eidôla*), which are incessantly streaming off from the surface of all bodies, and which are necessary to bring us into *rapport* with the world without. In like manner, he believed that sounding bodies threw off emanations, by which we are brought into sympathy with them; and that perception by smell took place in the same way. In psychology, E. was a decided materialist, holding, for various reasons, that the soul is a bodily substance, composed of subtile particles, disseminated through the whole frame, and having a great resemblance to spirit or breath with a mixture of heat.

In seeking to understand the phenomena of the heavens, E. has no scientific end in view; his sole object is to enable the mind to account for them to itself, without the necessity of imagining any supernatural agency at work. "The phenomena of the heavens," says E., "admit of various causes being assigned for their production, equally conformable to the facts learned from the senses. If, then, in thinking of any appearance, we suppose it brought about by the same cause that produces another appearance which gives no alarm or uneasiness, we are as much delivered from uneasiness as if we *saw* that such is the cause of it." E. did not deny that there are gods, but he strenuously maintained, that as "happy and imperishable beings," they could have nothing to do with the affairs of the universe or of men. "Beware," he says, "of attributing the revolutions of the heaven, and eclipses, and the rising and setting of stars, either to the original contrivance or continued regulation of such a being. For business, and cares, and anger, and benevolence, are not accordant with happiness, but arise from weakness, and fear, and dependence on others."

E. next proceeds to deal with the fear of death. Having proved in his psychology that the dissolution of the body involves that of the soul, he argues that the most terrible of all evils, death, is nothing to us, "since *when we are, death is not; and when death is, we are not*. It is nothing, then, to the dead or the living; for to the one class it is not near, and the other class are no longer in existence." Whether E. actually succeeded in removing the terrors of death by his syllogism, may be doubted.

The *positive* part of E.'s system may be noticed in a few words. He held that *pleasure* was the chief good, and it is from a misapprehension of the meaning of this word as used by E. that the term Epicurean came to signify one who indulged his sensual appetites without stint or measure. At the same time, it is easy to see that the use of the word "pleasure" was calculated to produce the mischievous results with which the later Epicureanism was charged. According to E., the sources and tests of all ethical truth are the feelings (*pathe*), and these are two, pleasure and pain. We delight in the one, and avoid the other instinctively. "When we say that pleasure is the end of life, we do not mean the pleasures of the debauchee or the sensualist, as some from ignorance or from malignity represent, but freedom of the body from pain, and of the soul from anxiety. For it is not continuous drinkings and revelings, nor the society of women, nor rare viands, and other luxuries of the table, that constitute a pleasant life, but sober contemplation that searches out the grounds of choice and avoidance, and banishes those chimeras that harass the mind." But, on the other hand, E. says: "If the means to which sensualists owe their pleasures dispelled the anxieties of the mind . . . and enabled them to set limits to their desires, we should have no grounds to blame them for taking their fill of pleasure, wherever they could find it, provided it were attended with no pain or grief from any quarter; for that is the only evil." The whole question of ethics, then, comes to a calculation and balancing of pleasures and pains; in other words, the cardinal virtue is *prudence*. E. rests *justice* on the same prudential basis as temperance. Denying any abstract and eternal right and wrong, he affirms that injustice is an evil, because it exposes the individual to disquietude from other men; justice is a virtue, because it secures him from this disquietude. "Injustice is not an evil in itself, but becomes so from the fear that haunts the injurer of not being able to escape the appointed avengers of such acts." The duties of friendship and good-fellowship are inculcated on the same grounds of security to the individual.

Among the Romans, the system of E. was adopted by many distinguished men. Horace, Atticus, and Pliny the younger were Epicureans; and the splendid poem of Lucretius must have recommended the system to many. In modern times, Epicureanism was resuscitated in France by Pierre Gassendi, who published an account of E.'s life and a defense of his character in 1647. Many eminent Frenchmen have professed his

principles; among others, Molière, Saint Evremond, Count de Grammont, the Duke of Rochefoucauld, Rousseau, Fontenelle, and Voltaire. See Lange's *History of Materialism*, Eng. tr. (1886).

EPICYCLE. The earlier astronomers assumed that all the motions of heavenly bodies took place in circles, the circle being held to be the most *perfect* of all curves; and a necessary consequence of this assumption was, that the motions must have a uniform velocity. Another part of the hypothesis was, that all the heavenly bodies moved round the earth, which remained at rest in the center. The observed phenomena of the heavens, however, were soon seen to stand in glaring inconsistency with these assumptions; and to remedy this, it was necessary to have recourse to additional assumptions. For the sun and moon, which manifestly do not always move with the same velocity, the eccentric circle (q. v.) was imagined. The case of the planets, whose motions were seen to be sometimes direct, sometimes retrograde, and sometimes altogether arrested, offered still greater difficulties; to get over which, the idea of *epicycles* was hit upon. According to this hypothesis, while a planet was moving in a small circle, the center of that small circle was describing a larger circle about the earth. This larger circle was called the *deferent*, and the smaller, which was borne upon it, was called the *epicycle* (Gr. *epi*, upon). In this way the motions of the planets about the earth were conceived to be something like what the motion of the moon about the sun actually is. By assuming proper proportions between the radii of the deferent circle and the E., and between the velocities of the two motions, it was found possible to account pretty satisfactorily for the above mentioned appearances and irregularities in the motions of the planets. But it is only the irregularities arising from the revolution of the earth about the sun that can be at all explained in this way, and not those arising from the elliptic motions of the planets about the sun, nor yet the inequalities of the moon's motions. The successors of the Greek astronomers, down to Tycho Brahé, continued, therefore, to increase the number of epicycles, setting one circle upon another, until the hypothesis, in itself complicated, became still more so, and made the simplicity of the Copernican system at once striking.

EPICYCLOID is the name of a peculiar curve. When a circle moves upon a straight line, any point in its circumference describes a cycloid (q. v.); but if the circle moves on the convex circumference of another circle, every point in the plane of the first circle describes an E.; and if on the concave circumference, a hypocycloid. The circle that moves is the generating circle; the other, the base. The describing point is not necessarily in the circumference of the generating circle, but may be anywhere in a radius or its prolongation. This curve was first investigated by the Danish astronomer Römer. It has many remarkable properties, and is even useful in the practical arts. The teeth of wheels in machinery must have an epicycloidal form, in order to secure uniformity of movement.

EPIDAMNUS. See DURAZZO.

EPIDAUROS, a t. of ancient Greece, on the eastern shore of the Peloponnesus, in the district of Argolis, was situated on a small promontory, 15 stadia in circumference, in the Saronic gulf, in lat. 37° 38' n., long. 23° 10' east. During the most prosperous period of Grecian history, E. was an independent state. It was colonized first, it is supposed, by Carians (hence the older name of *Epicarus*, according to Aristotle), and afterwards by Ionians, but was subsequently invaded by a Dorian army under Deiphontes, the son-in-law of Temenus the Heracleide. This force dethroned Pityreus, the Ionian king of E., compelled him and his citizens to retire to Athens, and inaugurated the Dorian rule, which preserved the ascendancy at E. during the whole of the historical period. The form of government was originally monarchical, but after many vicissitudes, it eventually became and remained oligarchical. At an early period, E. became one of the chief commercial cities of the Peloponnesus. It colonized the islands of Cos, Calyd-nus, and Nisyros, as well as the town of Ægina, which, during the 6th c., attracted all its commerce from the then declining mother-city. E. was chiefly famous for its temple of Æsculapius, to which patients resorted from all parts of the Hellenic world, seeking cures for their diseases. The site of this temple was a plain surrounded by mountains, about 5 m. w. of the town, and which is still called Hieron, the sanctuary. E. had also numerous temples, among which were those of Artemis, Dionysus, Aphrodite, and Hera, and a magnificent theater, at present in a more perfect state of preservation than any in the Peloponnesus, and with sufficient accommodation for 12,000 spectators.

E. (modern Greek, *Epídavro*) is now a small village, with scarcely 100 inhabitants, employed for the most part in raising vegetables for the Athenian market. The plain surrounding the village is productive and highly cultivated. Here, in Jan., 1822, a congress from all parts of Greece assembled, and promulgated the constitution, known as the constitution of Epidaurus.

EPIDEMIC (Gr. *epi*, upon, and *dēmos*, the people), a disease which attacks numbers of persons in one place simultaneously or in succession, and which in addition is observed to travel from place to place, often in the direction of the most frequented lines of communication. Many E. diseases are also contagious, and all of them suggest the necessity of careful inquiry into the ventilation, drainage, food, drink, and habits of the persons liable to be affected. In presence of an E., it is proper to take unusual precautions to

preserve the public health (see article **HEALTH**), and not unfrequently the organization of a regular house-to-house visitation of the locality is calculated to do much good, by directing the minds of the poor and ignorant to their duties in respect to themselves and to each other. See **ENDEMIC** for further observations on this subject; also **CONTAGION**, **INFECTION**, **FEVER**, **CHOLERA**, etc.

EPIDEMIC CEREBRAL MENINGITIS is a disease which has been noticed and described by many American physicians since the year 1811, when Dr. North specially drew the attention of the profession to it. In 1838-40, it appeared in France, and committed great ravages in Versailles, where the mortality was 28 per cent; in Strasburg, where the mortality was 42 per cent; in Lyons, Nancy, and other garrison towns. The patients, in these cases, were almost entirely young conscripts; and the disease was regarded as non-infectious. In the spring of 1846, it appeared in the Dublin and Belfast workhouses, boys under 12 years of age being the only victims, while girls under similar circumstances escaped; it likewise appeared in the constabulary depot, in the same year, amongst the recruits. In 1863, it was very fatal in the United States. In 1865, it ravaged West Prussia: of 2,000 cases recorded, half died; and of 347 cases, 330 were under 14 years of age. In this epidemic, no mention is made of the purple spots which excited such alarm in Ireland; and in the United States, two forms of the disease are recognized—one marked by shock, weak pulse, purpled limbs, and coma, death happening within the first day; the other presenting signs of cerebro-spinal mischief, such as tetanoid spasms, and death here occurring in three days. Purple spots were present in 27 out of 44 cases.

We now pass to the consideration of the so-called *black death*, which, during the two years 1866 and 1867, caused such intense alarm in Ireland, and especially in Dublin. The history of this disease is as follows: A healthy medical student, aged 19, residing in Dublin, fell ill with chilliness and *malaise* about noon on Mar. 18, 1866. When he was visited in the evening, it was found that he had vomited frequently and was very prostrate; purple blotches appeared on his skin during the night, and about noon next day, he suddenly fell into stupor, and was dead at two, or about 26 hours from the apparent commencement of the symptoms. Drs. Stokes and Benson, who, with Mr. Croly, saw the case, at once recognized it as presenting a novel type of disease. A girl, aged 18, presented similar symptoms on April 2, but recovered. Fatal cases were recorded on May 12, 13, and 17. According to Dr. Mapother—from whose excellent report “On the malignant purple fever epidemic in Ireland,” read before the epidemiological society in July, 1867, the materials of this article are almost entirely drawn—it appears that 63 fatal cases had been registered (up to July) in the Dublin district, exclusive of eight deaths amongst soldiers. This able physician gives the following description of the symptoms, which include two types of very different severity, and in this respect he agrees with the American observers. In the graver, life is rapidly extinguished as if by a blood-poison; in the milder, the symptoms are those of inflammation of the cerebro-spinal axis, or its membranes. Dr. Stokes, however, regards these latter phenomena as secondary to the essential disease, and believes that they will always appear, if the patient lives long enough for their development. The earliest symptoms are chilliness and a sense of impending danger, and vomiting of a persistent character soon follows. There is constipation till shortly before death, when the evacuations are involuntarily discharged. The tongue is dry; the pulse abnormally compressible, and usually over 100. The dark purple blotches, caused by the escape of dissolved hematine (coloring matter of the blood) from the smaller vessels, are situated in and under the true skin of the legs, hands, face, back, and neck. These patches vary in size from that of a pin's head to that of a walnut, and are often sufficiently raised to be detected by the touch. The skin is dusky and moist, sometimes even bathed in sweat. In some cases, stupor, and in others, delirium and intense restlessness, are the forerunners of death. The rapidity with which this disease runs its course is appalling. A healthy boy, aged 10½ years, sank in less than 5 hours from the time of his seizure; and of 41 investigated fatal cases, 14 terminated within 24 hours. Of these cases, 21 were females, and 20 males. Youth predisposes very strongly to the disease. No position in life affords exemption; one young nobleman, three medical students, two undergraduates, and several inhabitants of the lowest hovels—the seats of typhus and cholera—were amongst the victims.

With regard to treatment, almost every kind has been tried, and each has been found equally unavailing. The external application of cold to the spine and head, as advocated in various forms of disease by Dr. Chapman, deserves a trial. Dr. Mapother suggests that the disease is due, like scurvy, to the want of fresh vegetables as an article of food; and if this view is correct, it is satisfactory to feel that if this terrible malady is incurable, it is at all events preventable. A few cases of this disease have been recorded as occurring quite recently in various parts of England. They would probably have passed unnoticed but for the Dublin epidemic. See **MENINGITIS**.

EPIDEMIC MENTAL DISEASES. When we consider how ordinary and normal thoughts and emotions spread from one man to many, and sway multitudes to the same views and actions, it is no longer a mystery that morbid conditions of the mind should become at times no less epidemic than physical diseases. Such, at least, is the fact. A

mental disorder may spread from man to man, and may involve whole nations. It depends for its propagation, like an epidemic disease, first upon external circumstances, and secondly, upon the peculiar condition or constitution of the individuals affected. Like the bodily affection, the causes which provoke the insanity and the tendency to be affected may have been in process of development for years. Both attack the weak rather than the strong; both exist for a season, and disappear. In the case of the mental malady, the external influences—those which constitute the moral atmosphere—are ignorance or imperfect knowledge, the power of one mind over another, the influence of language, the diffusion of particular opinions, the tendency to imitate. It is probable, however, that physical causes exercise an important influence in the production of such general mental conditions. In 1842 and 1844, there occurred in Germany and France, among the military, epidemics of meningitis with delirium, or inflammation of the membranes of the brain, when no moral factors were at work, but when diet, temperature, etc., were. But even where the origin cannot be so distinctly traced, the co-operation of external as well as psychical agents may be legitimately predicated. It would accordingly be illogical to limit the production of the dancing mania (q. v.), which occasionally, during several centuries, swept over Europe, to the reaction succeeding the dread of the end of the world, which had previously prevailed epidemically. An examination of about a hundred manifestations such as that alluded to, collected from various sources, demonstrates that not merely the intoxication of joy, but the most absurd forms of belief—that dreams, delusions, superstitions, corruptions of language, all instincts and passions, even movements and cries, may assume the forms, and, to a certain extent, may follow the laws of epidemic diseases. In far-distant ages, there are records of a histrionic plague, when, after a summer of intense heat, all conceived themselves players, and traversed the streets, and sunk and died, repeating verses, and exhibiting extravagant gesticulations; of whole communities being stricken with nightmare, which was so general as to be supposed and called contagious. There have been epidemics of homicidal and suicidal mania. In one age, hundreds are found possessed by Satan; in another, larger numbers converted into wolves; and in recent times, the leaping ague of Forfarshire, and outbursts of pyromania in various places, remind us that there may be still in the constitution of the human mind, and in the education and the habits of life prevailing, elements capable of realizing the catastrophe suggested by bishop Butler's question: What is to prevent a whole nation becoming mad? The instances of epidemic mental disease recorded in the following table, have been selected from a vast number of others, with a view of showing not the frequency or extent of such affection, but the range of the phenomenon through the powers and propensities of our nature.

| Popular Name. | Form of Disease. | Year. | Number Affected. | Authority. |
|---------------------------------|------------------|------------|------------------|--------------------------|
| St. Vitus's—St. John's Dance... | Choreomania | 1374 | Hundreds | Hecker. |
| Wolf-madness..... | Lycanthropia | 1523 | " | Calmiel. |
| Possession..... | Demomania | 1642, etc. | " | " |
| Convulsionaries of St. Medard. | Theomania | 1731 | " | " |
| Incendiarism..... | Pyromania | 1800 | Many | Marc. |
| Witchcraft..... | Demopathia | Various | Thousands | Various. |
| Suicide..... | Melancholia | " | " | Esquirol. |
| Visions..... | Delusions | " | Many | { Brierede, Boismont. |
| Timoria, Panic..... | Panphobia | 1845 | Many | { Edin. Review, 1849. |

There appears to be no guarantee that the present and future generation shall be exempted from similar visitations, except in the universal diffusion of knowledge and sound thinking, for it is invariably in the darkness of ignorance or in the twilight of imperfect knowledge that the moral plague comes.—Hecker's *Epidemics of the Middle Ages*; Calmiel, *De la Folie considérée sous le Point de Vue Pathologique, Philosophique, Historique et Judiciaire, depuis la Renaissance des Sciences en Europe jusqu'au dix-neuvième Siècle*, etc.; and *Psychological Journal*, *passim*.

EPIDENDRUM, a genus of epiphytic orchids, of which there are 7 examples in the United States, some growing upon magnolia trees. The blossoms are greenish-purple, growing in large clusters. Some of the many species in the tropics are very showy, and some have cathartic qualities.

EPIDERMIS (Gr. *epi*, upon, and *derma*, the skin), a semi-transparent membrane, containing neither vessels nor nerves, and everywhere forming an external covering to the corium or true skin. See **SKIN**. The E. is called in ordinary language the *scarf-skin*. It consists of two layers, chemically and morphologically distinct—viz., the *mucous layer*, which lies immediately upon the corium, and the *horny layer*, which forms the outermost surface of the body.

The *mucous layer* (known formerly as the *rete mucosum s. malpighianum*) is of a whitish or slightly brown tint (in the negro, dark gray or black), and is composed of small soft cells. The innermost of these cells, resting on the surface of the corium, are elongated and arranged perpendicularly; upon these follow elongated or roundish cells in many layers, which, in proportion to their distance from the corium, acquire, from

their mutual pressure, a polygonal form, which may even be recognized in individual cells.

All the cells in the mucous layer are nucleated vesicles distended with fluid, and likewise containing minute granules, which diminish in number in the more external cells.

The *horny layer* forms the external semi-transparent part of the E., which in the white races is colorless, and is composed almost wholly of uniform cells, metamorphosed into plates or scales. The deepest plates in some degree resemble the uppermost cells of the mucous layer; but in the second or third layer we find the flattening commence; till at length, after a gradual series of modifications, we have the hard, horny scales which occur on the surface, where they are regularly cast off with more or less rapidity, and replaced by those beneath them.*

The color of the E. differs in different persons and in different parts of the body. It is deepest around the nipple, especially in women during pregnancy and after they have borne children. A more or less dark pigment is often deposited, in persons who are exposed to the sun, in the face, neck, back of the hands, etc. These tints are not produced by special pigment-cells, but are seated in the common cells of the mucous layer, round whose nuclei granular pigment is deposited. In the negro and the other colored races, it is also only the E. which is colored, while the *corium* completely resembles that of Europeans. The perpendicular cells are the darkest, and form a sharply marked fringe at the edge of the clear corium. To these succeed brown cells, which accumulate in the depressions between the papillæ, and as we approach the horny layer, we have yellowish cells. The horny layer of the negro also inclines to a yellow or brownish tint.

Morbid coloration of the E. (freckles, mother's marks, etc.) is produced in the same way as the color of the negro's skin. Numerous instances of partially or entirely white negroes and of black Europeans, not as a consequence of change of climate but as an abnormal condition of the skin, are on record.

The thickness of the E. varies extremely. While upon the cheeks, brow, and eyelids, it varies from $\frac{1}{4}$ th to $\frac{1}{5}$ th of a line, on the palm of the hand it ranges from $\frac{1}{4}$ d to $\frac{1}{2}$ a line, and on the sole of the foot sometimes even exceeds a line. In some parts of the body the horny layer is thicker than the mucous; in other, the mucous is the thicker of the two. As the chief use of the E. is that of affording protection to the soft and tender subjacent parts, it attains its greatest thickness on those portions of the body (the palm of the hand and the sole of the foot) which are most exposed to pressure and friction.

In *plants*, as in animals, the E. is formed of flattened cells, of which also new layers are continually produced from the bark below, whilst the outer ones dry up, lose their vitality, and peel off, crack and split off, or otherwise become separated from the living organism. The cells of the E. are often enlarged outwards, so as to form projections, sometimes very slight, sometimes elongated into hairs (q.v.). Glands are also connected with the E., sometimes by the intervention of hairs, sometimes without, and in this way it contributes to the secretion of substances formed in plants by the wonderful chemistry of nature, and on which their value to man often greatly depends. The cells of the E. are usually filled with a colorless fluid, but resinous and waxy substances are sometimes found in them, and sometimes silica (as in grasses and equisetaceæ), sometimes carbonate of lime (as in the *charas*). The epidermis is pierced by *stomata* (q.v.). When the E. of plants is subjected to prolonged maceration, it can often be made to separate into two parts; one, which is more strictly called the E., being the inner, lower, and thicker membrane; the other, which is called the *pellicle* or *cuticle*, being very thin, and extending continuously over every part of the plant except where it is pierced by the stomata. Thus, this superficial pellicle invests even the finest hairs. In some of the *algæ*, it seems to constitute the whole integument. In the greater number of plants, the E. is thin and soft, but sometimes it is thick, and sometimes hard.

EPIDOTE, a mineral allied to garnet, composed of silica and alumina, with a considerable proportion of lime, or of peroxide of iron, or of peroxide of manganese. These diversities of composition constitute three very distinct varieties; and of these there are sub-varieties, differing in color and other particulars (*pistacite*, *bucklandite*, *withamite*, *zoisite*, etc.). E. is sometimes found massive, foliated, columnar, granular, or incrusting; often crystallized. Its crystals are prisms, variously modified. Its prevalent colors are green, yellow, and gray, but some of the varieties are red and black. It is found in gneiss, syenite, trap, and other rocks in a number of localities in Scotland, and in many parts of the world.

EPIGÆA REPENS. See ARBUTUS, TRAILING.

EPIGASTRIUM (Gr. *epi*, over, and *gastēr*, the stomach), the part of the abdomen (q.v.) which chiefly corresponds to the situation of the stomach, extending from the

* In reptiles and amphibians, this layer is periodically cast off in a more or less entire state, a new one being previously formed beneath it; and in man, desquamation in large patches often occurs after certain diseases, especially scarlatina.

sternum towards the navel or umbilicus (q.v.), and bounded on each side by the hypo-chonders (q.v.). It is called in popular language the pit of the stomach.

EPIGENESIS (Gr. *epi*, upon, and *genesis*, a formation), a formation upon, or in addition to, previously existing parts. The word is applied in physiology to that theory of new formations in organized beings which supposes them to spring from superadded centers of vital activity, as opposed to the theory which presumes that the new is formed by a development or modification of the old structure. See REPRODUCTION.

EPIGLOTTIS. See LARYNX.

EPIGONI, in general, sons of descendants, applied more particularly to certain mythical chiefs who fought against Thebes. After the catastrophe which brought about the death of Jocasta and the blinding of Œdipus, Eteocles, and Polynices, the sons of Œdipus and Jocasta incurred the wrath of their father, whom they sent forth alone and blind to fight with poverty. The father's curse rested on them, and resulted in the famous "war of the seven against Thebes." All the chiefs who led the war were slain except Adrastus. A second war was undertaken by the children of the fallen chiefs, and this is known as the "war of the Epigoni." The Epigoni were victorious, and Thebes was taken, Thersandrus, the son of Polynices, being seated on the throne of Cadmus. In literary history, the term E. is sometimes applied to a scholar who limits himself to unfolding the ideas of the great masters of a previous age.

EPIGRAM, a word derived from the Greek, and literally signifying an "inscription." In point of fact, the epigrams of the Greeks were simply inscriptions on tombs, statues, and monuments, written in verse, and marked by great simplicity of style, but having nothing in common with what now passes under the name. It was among the Romans that the epigram first assumed a satirical character. Catullus and Martial are reckoned the best Latin epigrammatists. In modern times, an epigram is understood to be a very short poem, generally from two to eight lines, containing a witty or ingenious thought expressed in pointed phraseology, and in general reserving the essence of the wit to the close, as the serpent is fabled to keep its sting in its tail. The French excel all other nations in this kind of poetry. Their earliest epigrammatist of any note was Clement Marot (1495-1544); their best are Boileau, Voltaire, and Piron. The epigrams of German writers are for the most part happily expressed moral proverbs, but the *Xenien* of Schiller and Goethe contain not a few sharp and biting verses of a satirical character. In English, Pope, Burns, Byron, Moore, and other writers have shown a remarkable power of epigrammatic satire. See Booth, *Epigrams, Ancient and Modern* (1863).

EPIGRAPH (Gr. *epi*, upon, and *grapho*, I write), a terse inscription placed upon architectural or other monuments, for the purpose of denoting their use or appropriation.

EPIGRAPHY. See INSCRIPTIONS.

EPILEPSY (Gr. *epi*, upon, and *lambanō*, future, *lēpsō*, I seize), a form of disease characterized by sudden insensibility, with convulsive movements of the voluntary muscles, and occasionally arrest of the breathing, owing to spasm of the muscles of respiration, and temporary closure of the glottis (see LARYNX). E. was called by the ancient Greeks the "sacred disease." Owing to the mysterious and extraordinary character of the convulsion of E., it was always, in ancient times, supposed to be due in a very special manner to the influence of the gods, or of evil spirits; Hippocrates, however, combats this idea in a special treatise, in which he maintains that E. is no more and no less divine than all other diseases. The same idea of the specially supernatural character of E. is shown forth in the deeply rooted oriental notion of demoniac possession. See DEMONIACS. E. is often called, in modern language, the "falling sickness," and this name is not only descriptive of one of its most striking phenomena, but also points distinctly to the most obvious danger of the fit. The patient is seized, without reference to his condition or occupation at the moment, with insensibility, often so complete and sudden as to lead to serious accidents and bodily injuries; in the most aggravated cases, he has no premonitory sensations whatever, but falls down without any attempt to save himself, and usually with a wild inarticulate cry of some kind, immediately after which the face is violently distorted, the head drawn towards one or other shoulder, and the whole body convulsed. These convulsions follow in rapid succession for a few minutes, and are attended by foaming at the mouth, and by great lividity, or, in some cases, livid pallor, which, with the irregular spasmodic movements of the lips, nostrils, and eyes, give a frightfully ghastly expression to the countenance, and almost invariably lead the bystanders to an exaggerated idea of the immediate danger of the fit. The immediate danger is, in reality, not great, excepting that the sudden attack may lead to an injurious or fatal fall; the tongue, however, may be bitten if protruded during the convulsion, or the patient may be so placed as to injure himself seriously by the repeated and unconscious movements of his body, or he may suffocate himself by accidentally falling with his face in water, or otherwise closing up the mouth and nostrils, or by dragging upon a tightened neckcloth. Care should be always taken to avoid these accidents by keeping the epileptic as much as possible within view of persons acquainted with his condition, and able to give such assistance as may be required; as well as by warning the patient himself to avoid all places in which a fall would be especially dangerous. But when an unskilled person happens to witness a fit of E.,

he will do well to remember that beyond the simplest and most obvious precautions against the dangers mentioned above, there is literally nothing to be done; and any attempt to rouse the patient by violent stimuli, as ammonia applied to the nostrils, or by dashing water in the face, or, still more, by administering medicines hastily recommended by the ignorant and thoughtless, is almost certain to do more harm than good. The tongue should be looked to, a piece of cork or other gag being, if necessary, inserted between the teeth; the patient should be then placed on a mattress or other soft place near the ground; his neckcloth should be removed, and the dress loosened round the chest; the head should be, if possible, a little raised, and a free circulation of air maintained (this last precaution being very apt to be neglected in case of a crowd); with these things done, it may be safely affirmed that in the vast majority of epileptic cases nothing has been left undone which will conduce to recovery. The ordinary course of the fit (which usually lasts from five to twenty minutes altogether) is as follows: the convulsions gradually diminish in intensity, and the patient passes into a state of deep but motionless stupor, with dilated pupils, and sometimes, but not always, with snoring or noisy breathing; the foaming at the mouth ceases, the color gradually returns, and this state leads to recovery through a more or less protracted, but apparently natural sleep, the patient, on awaking, being often quite unconscious that he has been the subject of any anxiety, or, indeed, in any unusual condition whatever. Although in all cases of true E. there is a stage of complete coma (q.v.), or unconsciousness, yet the fit is often very transient, and but little attended by convulsion, being also less sudden than above described, and not necessarily causing a fall to the ground; in some cases, also, fits of greater intensity are preceded by certain premonitory symptoms or peculiar sensations, which act as warnings to the patient himself, and lead him to place himself in a position of safety on the approach of the paroxysm. Having in view these distinctions (which are certainly of considerable practical importance), the French language, both popular and scientific, has adopted the terms of *grand mal* and *petit mal* (i.e., great and little evil), as characterizing the more and less dangerous forms of E. respectively. The sensations which precede the fit in some epileptics have been termed in Latin the *aura* (i.e., breath) *epileptica*, from their supposed resemblance to a current of cold air passing over the body, and proceeding from the extremities towards the head. This description does not, however, hold good in all cases; and not unfrequently, as mentioned above, there is no *aura*, or unusual sensation of any kind, preceding the fit. It must be mentioned, however, as bearing on treatment, and as being quite within the bounds of popular medicine, that some of the most ancient authorities assert strongly the power of a tight bandage, placed suddenly upon the limb in which the *aura* begins, to cut short, or even to prevent altogether, the fit of epilepsy. Although this alleged fact has often been regarded as doubtful, it has never been altogether discredited, and has of late years been brought into renewed notice by good observers. It is even maintained that such a bandage, placed experimentally upon one or other of the limbs, and tightened on the approach of a fit, has been found effective in some cases in which there was no distinctly local sensation; and epileptics have been repeatedly convinced of the propriety of habitually wearing a bandage loosely applied upon the arm, which they have been able, by carefully watching their own sensations, and by being watched in turn by others, to get tightened at the proper time. There is no doubt room for fallacy in these observations, but they may safely be commended to notice, as involving no possible risk of mischief, and as far more worthy of extended trial than the great majority of popular remedies in epilepsy.

But the fit and its treatment form only a part of the anxieties which arise out of a case of epilepsy. The ultimate danger of the disease has little relation to the severity of the individual fits, except in the modified sense explained above; the frequency of the attacks being apparently much more apt to influence the duration of life than their character. Indeed, although epileptics may survive several severe paroxysms at distant intervals, and recover in the end with an apparently unbroken constitution, it rarely happens that very frequently repeated attacks, even of the *petit mal*, are unattended by some permanent depreciation of the powers of mind or of body. The most frequent, perhaps, of all the more serious consequences of confirmed E. is insanity (q.v.), sometimes assuming the form of acute mania or monomania following the attacks, but quite as frequently tending to gradual imbecility without any acute seizure. Sometimes the development of the epileptic insanity, or dementia, is attended by palsy, and other indications of structural disorder of the brain; in other instances, no such consequences occur, and the brain after death may be found to have very little tangible disease, or only such disease as is found in numerous other cases of functional derangement. Very often, even when the mind remains tolerably entire, there is loss of memory, and a certain want of acuteness and depression of spirits, which unfit the individual for the regular business of life. Disorders of the digestion are also not uncommon; and there is frequently a want of tone and vigor in all the bodily functions, which communicates a habitual expression of languor and reserve to the epileptic. Added to this, it can hardly be matter of surprise that the knowledge of his infirmity should deeply influence the mind of the epileptic, and produce a distaste for active occupations, especially for such as expose him to more than ordinary observation.

The causes and the radical cure of epilepsy are almost equally involved in mystery.

It has been supposed by some to be dependent on an increased afflux of blood to the brain; while by other observers and pathological authorities it has been attributed, with about equal force of reasoning, to precisely the opposite condition. Certain cases undoubtedly depend upon organic disease, as tumors or injuries to the brain and its membranes, more especially near the surface. Local sources of irritation in other parts of the body have also been supposed to be exciting causes of E.; and cases are recorded in which the disease has been cured by the amputation of a finger or the division of a nerve. The attention of recent observers has been especially directed to the medulla oblongata and spinal cord (q.v.), as being the most probable physiological seats of a disease so decidedly marked by convulsive movements. But as yet little more than the most vague theoretical inferences can be drawn from their researches as to the cause either of the morbid tendency in E. or of the paroxysm. One of the most curious and suggestive of these recent facts is the experiment of Brown-Sequard, showing that E., or a state closely resembling it, may be induced in certain animals by division of certain portions of the spinal cord, the artificial disease continuing long after the primary effects of the injury have ceased. A still more curious and inexplicable phenomenon has resulted from the multiplication of such experiments; for Brown-Sequard has shown that in guinea-pigs this artificial E. is sometimes propagated to the offspring, becoming, like the natural disease, a hereditary and congenital morbid tendency. On these strange facts it would be premature to indulge in speculation in this place, but their great importance can hardly be overlooked.

The condition of the epileptic seems to be favorably affected by everything which conduces to a quiet and hopeful state of the mind, and to a vigorous condition of the body. The treatment of the disease should therefore, in general terms, be of the kind termed *tonic* (q.v.), and should be adapted with care, and after very minute and careful inquiry, to the removal of all the special bad habits, and occasional causes of depression, which tend to bring the system into a condition *below par*, in the individual case. The influence of a happy and quiet domestic life, without unhealthy excitement, and with proper occupations, varied by amusement and exercise in the open air, can hardly be overestimated. The marriage of epileptics is, however, not too readily to be sanctioned, as it has been known to be followed, not only by an increase of the disease, but by its transmission to a considerable portion of the family. On the other hand, a too absolute rule on this subject is not without its dangers, and perhaps the practical difficulties of the question are not to be met by any defined or dogmatic expression of opinion, founded on the general pathology of the disease. If the tendency exist, even slightly developed, upon both sides in such a connection, it needs hardly be stated that the dangers of transmission to the descendants is increased in a very great degree. Hence, intermarriages *within epileptic families* must be regarded as always in the highest degree imprudent. Parents and guardians are undoubtedly justified in making this disease an object of special solicitude, and reserve or concealment on this subject on either side, in the case of a proposed marriage, should be regarded as equally dishonorable with any other form of deception in a matter so important to the welfare of society and of the parties concerned.

According to one of the ablest and most respected of American physicians (Dr. Jackson, of Boston), the epileptic tendency may often be successfully treated by the systematic use of an exclusively vegetable diet, or by a very considerable reduction of the proportion of animal food. Among the innumerable remedies recommended by authorities, the salts of iron and zinc have perhaps the largest amount of experience in their favor; and counter-irritants (q.v.) applied to the nape of the neck, or between the shoulders, either by blistering, the use of the seton, or even actual cautery, has been often followed by prolongation of the intervals, or decrease in the severity of the fits. Almost all the accredited remedies, however, have been observed to produce a temporary relief of this kind, even when without any permanent influence on the course of the disease.

Some of the *lower animals* are subject to epileptic fits. The disease is common in dogs and highly-bred pigs. The creatures writhe with involuntary spasms, and are for the time without sight or hearing. Sometimes the muscles of the throat are so involved that fatal suffocation occurs. The attack is generally preceded by dullness, and lasts from ten to thirty minutes. It is generally traceable to torpidity or irregularity of the bowels, worms, debility, or plethora. In dogs, it is a frequent sequel of distemper. In cattle, it usually occurs in connection with the engorgement of the first or third stomachs; they throw themselves violently about, bellowing loudly, but seldom die. It is rare in horses, and differs from megrims, for which it is often mistaken, but in which there are no spasms. The treatment consists in freely opening the bowels, removing worms, if any are present, enjoining bleeding and spare diet, if the patient's condition is high, and generous feeding and tonics where it is low. The best preventives are carefully regulated diet, an occasional laxative, with a course of tonics, and especially of arsenic.

EPILOBIUM, a genus of plants of the natural order *onagraceæ*, having four deciduous calycine segments; four petals; a much elongated, 4-sided, 4-celled, 4-valved, many-seeded capsule; and seeds tufted with hairs at one end. The species are herbaceous

perennials, natives of temperate and cold countries, and very widely diffused both in the northern and in the southern hemisphere. Some of them are very ornamental, from the beauty of their flowers. Most of the British species have small flowers, and some of them are very common in moist places. *E. angustifolium*, which differs from all the other British species in having the petals dissimilar in shape and size, is frequently planted in gardens and shrubberies, on account of its numerous and beautiful rose-colored flowers; but its creeping roots are apt to overrun a flower-garden. It is sometimes called FRENCH WILLOW, from the resemblance of its stems and leaves to some kinds of willow, and the name WILLOW-HERB is often extended to the whole genus. It is found in very northern regions, and its leaves and young shoots are sometimes a grateful addition to the meals of the arctic traveler, although not likely to be relished in almost any other circumstances. The pith, when dried, yields a quantity of sugar to boiling water, and is used in Kamtchatka for making a kind of ale, from which also vinegar is made.

EPILOGUE (Gr. *epi*, upon or after, and *logos*, a speech) means, in oratory, the summing up or conclusion of a discourse; but, in connection with the drama, it denotes the short speech in prose or verse which frequently, in former times, was subjoined to plays, especially to comedies. The E. was always merry and familiar in its tone, and was intended to establish a kindly understanding between the actor and the audience, as well as to conciliate the latter for the faults of the play, if there were any, and to send them away in good humor. One of the neatest and prettiest epilogues ever written, and one which completely realizes what an E. should be, is that spoken by Rosalind at the conclusion of Shakespeare's *As You Like It*.

EPIMACHUS, a genus of birds of Australia and Papua, not unlike the bird of paradise; in color, violet black or black brown, with a collar of feathers margined with green at the base of the neck. The tail feathers consist of about 12 long plumes ending in thread-like points. The head and breast are brilliant blue.

EPIMENIDES, a Greek poet and priest, b. probably at Phæstus in Crete, in the 6th or 7th c. B.C., and lived at Cnossus. His history has only reached us in a mythical form. He is said to have fallen asleep in a cave when a boy, and not to have awakened for 57 years. Like Rip Van Winkle, he was naturally much astonished and perplexed on his return to broad daylight. His period of slumber, however, had not passed away unprofitably. His soul, disengaging itself from its fleshly prison, betook itself in the interval to the study of medicine and natural philosophy; and when it had shuffled on again its mortal coil, E. found himself a man of great knowledge and wisdom. Goethe has written a poem on the subject, *Des Epimenides Erwachen*. E. went to Athens about 596 B.C., where, by the performance of various mystical rites and sacrifices, he stayed a plague with which the inhabitants were afflicted. When he died is not known, but we may be certain that he did not live (as is fabled) for 299 years. That he wrote the epic poems attributed to him, the longest of which was on the Argonautic expedition, is considered highly improbable. Compare Heinrich, *E. aus Kreta* (1801).

EPINAL, a t. of France, in the department of Vosges, is situated in a delightful district at the western base of the Vosges mountains, on both banks of the Moselle, about 200 m. e.s.e. of Paris. Lat. 48° 10' n., long. 6° 26' east. It is a well-built, handsome town, with clean and regular streets, and is surmounted by the ruins of an old castle, the gardens attached to which are much admired. Among its chief buildings are the parish church, an antique Gothic structure; the hospital, formerly a Capuchin convent; a museum of pictures, antiquities, and natural history; the barracks; and the residence of the prefect of the department. E. has a variety of manufactures, including cotton fabrics, wrought-iron, pottery, cutlery, paper, and leather, and has some trade in grain, wine, timber, etc. Pop. '91, 21,431.

ÉPINAY, LOUISE FLORENCE PÉTRONILLE DE LA LIVE D', a French writer, b. March 11, 1726. At the age of 19, she married her cousin, M. d'Épinay, but the union did not prove a happy one. While her husband was abandoning himself to dissolute courses, she sought the intercourse of philosophers and men of genius. In 1745 she formed a close intimacy with Rousseau, and presented him with a small house (the now famous Hermitage) which stood on one of her husband's estates in the woods of Montmorency. An unfortunate jealousy, however, which Rousseau conceived for Grimm, another friend of Mme. d'É., was followed by an open rupture with his benefactress, and in his *Confessions* he scrupled not to malign her by way of vengeance. She spent the remaining 25 years of her life in comparative solitude, seeing only a small and select circle of philosophers and littérateurs. When Grimm was obliged to leave Paris, she continued, under the direction of Diderot, his literary correspondence with northern sovereigns. She died in 1783. From the pen of Mme. d'É. we have *Conversations d'Émile* (Paris, 1774), a work on education pronounced by the French academy to be the most useful that had been published for a number of years; *Mémoires et Correspondance de Madame d'Épinay renfermant un Grand Nombre de Lettres inédites de Grimm, de Diderot, et de J. J. Rousseau, etc.* (Paris, 1818); *Les Confessions du Comte de ****; etc.

EPIPHANIUS, SAINT, a Christian bishop, and writer, was b. of Jewish parents in Palestine about 315 A.D. He was baptized in his 16th year, and was educated among the Egyptian monks, who inspired him with an aversion to all liberal science. He rose

gradually to the rank of bishop of Constantia (formerly Salamis) in Cyprus, and continued in that office from 367 till his death in 403. His polemical zeal was conspicuously manifested against Origen. He had proclaimed him a heretic in his writings, and in 394 he went to Palestine, the focus of Origen's adherents, and called upon John, bishop of Jerusalem, and the two monks, Rufinus and Jerome, to condemn him. A more legitimate object of his violent opposition was the increasing worship of images. Jerome relates how he indignantly tore down an image in the precincts of a church in Palestine, as being contrary to the divine law. Among his writings, collected by Petavius (2 vols., Paris, 1632), the most important is his *Punarión*, or catalogue of all heresies (80 in number), a work which strikingly shows his unfitness for being a historian. His credulity and want of honesty are excessive.

EPIPH'ANY (Gr. *Epipháneia*, appearance), denoted, among the heathen Greeks, a festival held in commemoration of the appearance of a god in any particular place. The word subsequently passed into the usage of the Christian church, and was used to designate the manifestation or appearance of Christ upon the earth to the Gentiles, with especial reference to the day on which he was seen and worshiped by the wise men who came from the east. This occasion is commemorated in the church on the 6th of Jan., the 12th day after Christmas, and hence the E. is also called twelfth day. The E., which is said not to have been observed as a separate festival, but to have been included in the feast of the nativity till 813, is observed as a "scarlet day" at Oxford and Cambridge.

EPIPHE'GUS, a parasitic herb growing from the roots of the beech tree, and seeming to grow from the ground independently. It is 6 to 12 in. high, purple or yellow-brown, slender, with scales instead of leaves. In Virginia it is called "cancer-root," and has the reputation of being a specific for that disease.

EPI'PHYTES (Gr. *epi*, upon, *phyton*, a plant), often and popularly, but less correctly, called air-plants, are plants which are not rooted in the ground, but are attached to trees, from the decaying portions of the bark of which, or of mosses and lichens which grow upon it, they derive their nutriment, probably, also, depending upon the air for it to a larger extent than other plants do. Mosses and lichens, themselves, growing upon trees, may be called E., but the term is generally used of phanerogamous plants. E. are not connected with the trees upon which they grow in the peculiar manner of the mistletoe, *balanophora*, and other true parasites—not sending roots like them into the wood to suck the juice of the tree. It is chiefly in warm climates that phanerogamous E. are found and in those which are also moist. Most of them prefer shady situations. Within the tropics, they often form an interesting and remarkable feature of the vegetation. Some of the *bromeliaceæ* (as *tillandsia*), *cactaceæ*, *araceæ*, *gesneraceæ*, and other natural orders are E.; but the order to which they belong more than to any other is *orchidaceæ*. Many of the epiphytous orchids, as well as other E., are remarkable for their beauty; and the attention which has recently been given to their cultivation in hothouses has been rewarded by the most perfect success. See ORCHIDS. Plants which usually occur as E. are sometimes also found growing on rocks. Although seldom found except in moist climates, E. are generally capable of enduring a considerable amount of drought, parding slowly with the moisture which they have once imbibed.

EPI'RUS, the ancient name of a part of Greece, bounded on the e. by the chain of Pindus, on the s. by the Ambracian gulf, on the w. by the Ionian sea, and on the n. by Illyria and Macedonia. It formed the southern part of modern Albania, or the pashalic of Janina, a wild and mountainous region, the haunt of robbers and semi-civilized tribes in all ages. The chief town was Dodona (q.v.); the chief rivers, the Acheron, Cocytus, Arachthus, and Charadrus. Anciently, it was celebrated for its cattle and its breed of Molossian dogs. Its earliest inhabitants were probably Pelasgians. In the historic period, Theopompus speaks of fourteen tribes, most of whom were believed by the Greeks themselves to be not of Hellenic origin. The principal were the Chaones, Threspoti, and Molossi, the last of whom finally obtained the entire sovereignty of the country. Of the Molossian kings of E., the most distinguished was Pyrrhus, who long waged successful war against the Romans. But after this race of kings became extinct (239-229 B.C.) by the death of Ptolemy, grandson of Pyrrhus, a republican constitution was adopted, whereupon parties sprang up among them, and the neighboring Macedonians got the upper hand. On the conquest of Macedonia by the Romans (168 B.C.), the Epirots were accused of having assisted Perseus, the Macedonian king, and the most revengeful measures were put in force against them. Æmilius Paulus, the Roman gen., plundered and razed to the ground the 70 towns of E., and sold into slavery 150,000 of the inhabitants. From this period, E. shared the vicissitudes of the Roman and Byzantine empires, until 1204, when one of the Comneni made himself independent. His dynasty ruled the country until 1466, when it was finally conquered by the Turks (see SCANDERBEG). E., peopled largely since the 14th c. by Albanians (see ALBANIA), formed latterly a part of the Turkish vilayet of Janina. The Berlin congress of 1878 recommended that the southern part of E. should be ceded to Greece. The district e. of the river Arta was ceded, 1881.

EPIS'COPACY (Gr. *episcopos*, bishop or overseer) is that form of church government in which one order of the clergy is superior to another—namely, bishops or prelates to

priests or presbyters, the ordinary ministers of parishes or congregations. It is sometimes called *diocesan episcopacy*, to distinguish it from that *episcopacy* which Presbyterians and Independents also assert—the oversight of flocks by their pastors. See BISHOP. It is not essential to E. that there should be *archbishops*, exalted in rank and authority above other bishops, although of the same order: and in some Episcopalian churches there are none.

E. has actually subsisted under very various modifications; the power of bishops being more or less absolute, or more or less controlled by synods of presbyters, or even—in the Protestant Episcopal church of the United States—by a diocesan convention, composed both of presbyters and lay delegates. The power of the bishop is also variously affected by the relations subsisting between church and state; and great differences exist in this respect between the church of England, the church of Sweden, and the church of Denmark, all Episcopalian, and all connected with the state as *established churches*.

The church of Rome, the Greek church, and other branches of the eastern church, are Episcopalian. Of Episcopalian Protestant churches not established, the most important are that in the United States, that in Scotland, and the Moravian church. See ANGLO-CATHOLIC CHURCH; and ENGLAND, CHURCH OF. After a great deal of learned discussion standard writers on both sides of the question now admit that the term “*episcopos*,” when it appears as a term of office in the New Testament, is synonymous with “*presbyter*,” the same officers of the church being called by both names—the one with reference to their duties, and the other to their age. The “*presbyters*” or elders of the Ephesian church were called by Paul “*bishops*” or overseers of the flock. In the pastoral epistles, both words are used interchangeably. Peter, exhorting the “*presbyters*” as their brother “*presbyter*,” speaks of their office as that of an overseer or “*bishop*.” 2. In each church of the New Testament there seems to have been, at first, a plurality of presbyters or bishops. In the church of Ephesus (as has just been said), there were presbyters who were bishops. In the church at Philippi, there were bishops as well as deacons. Paul and Barnabas, in their journey, ordained presbyters in every church. 3. In each church, it may be taken for granted that some one of the officers was chosen to preside. This choice, the advocates of prelacy affirm, was made at first by apostolic authority or in imitation of apostolic example. Presbyterian and Congregational writers, on the other hand, regard it as only a wise human arrangement similar to that which convenience and order suggest in all associations of men. 4. Gradually the two synonymous names of office were divided; “*bishop*” being restricted to the president, and “*presbyters*” continued to the rest. This division, the prelatical theory of church government asserts, was made by apostolic agency in the accomplishment of a divine intention that the bishop, as a successor of the apostles, should be vested with authority over the presbyters and the church. The non-prelatical theory, on the contrary, affirming that the apostles, as such, had no successors, maintains that the division of title and of function was made without apostolic agency and contrary to the spirit of the Savior’s command; that it was a result of the innate tendency in human nature to exercise and to yield authority, greatly stimulated and aided by imitation of the absolute control exercised by the civil government. 5. Even after this change had taken place, the episcopal office was regarded, theoretically, as possessing equal authority and honor. But gradations of rank began at once, practically, to arise similar to the gradations in civil government throughout the Roman empire. Bishops in the country and in the smaller towns or villages became subordinate to the bishop of the adjacent city. 6. As the chief city of each district had the civil rank of a “*metropolis*” or mother city, so the bishop of that city, styled metropolitan from his position, took the lead in the deliberations of the local synod as “*primus inter pares*,” and acted as the representative of his brother bishops in their intercourse with other churches. Thus, though all bishops were nominally equal, a superior dignity and authority came by general consent to be vested in the metropolitans. 7. A still higher dignity was assigned to the bishops of the chief seats of government—Rome, Alexandria, and Antioch; and among these the bishop of Rome, the capital of the empire, had precedence. 8. Convenience dictated that the ecclesiastical divisions should follow the civil divisions of the empire. Roman emperors saw with amazement Christianity copying their jurisdiction in every part of the land. As the struggle deepened, the Christian bishop and the Roman governor became two rival authorities, the representatives of warring kingdoms within the same domain. When Christianity, instead of being destroyed, became the established religion, and the two administrations were made one, the resemblance between them was perfected, and the gradations of ecclesiastical rank which had grown up by custom were ordained by law. The empire was divided, as to its secular government, into four prefectures; these were subdivided into dioceses, and the dioceses into provinces. The rulers of cities and districts were subject to the governor of their province; the governors of provinces to the governor of their diocese; the governors of dioceses to their prefect; and the prefects to the emperor. In like manner, the bishops of cities and districts were subjected to the metropolitan of their province; the metropolitans of the provinces to the metropolitan of their diocese; the metropolitans of the dioceses to the patriarch

of one of the chief cities (of which there were now four), Rome, Constantinople, Alexandria, and Antioch; and the patriarchs of these cities, like the prefects, had, at first, no superior except the emperor. 9. Theoretically, all these primatial sees were co-ordinate in authority and mutually independent. But by degrees the bishops of the more important cities overshadowed their brethren, and exercised a supremacy which, though due rather to custom than to recognized claims, was increasingly acquiesced in from the manifest advantage of having a strong central power which could interfere in theological controversies or ecclesiastical disputes with an authority to which all would bow. 10. As the cities, Rome and Constantinople were both capitals of the empire, so their bishops were exalted above all others. And as these two cities became rivals for the supreme place, so the two bishops contended with each other for the first place as universal bishop. 11. At length the western and eastern churches were torn asunder. With the decline of the empire, the grandeur of the eastern church was obscured, until both empire and church were overwhelmed by the Ottoman power and the Mohammedan faith. With the rise of new kingdoms and the conversion of new nations in the west, the bishop of Rome was lifted up as "the head of the universal church."

EPISCOPAL CHURCH, PROTESTANT, is the title of that portion of the Christian church in the United States which, before the revolution, was a part of the church of England. Its history is naturally divided into two periods. I. *During colonial times.* The settlement of Jamestown was commenced in 1607. Its charter required that the true word and service of God should be preached, planted, and used according to the rules and doctrine of the church of England, not only in the colonies, but also, as far as possible, among the savages around them. Rev. R. Hunt labored in his vocation with piety and zeal to the end of his life. After him, Rev. A. Whittaker acquired, by his devoted exertions, the title, "Apostle of Virginia." Under his instrumentality Pocahontas was converted and baptized. As the first colonists in Virginia were all members of the church of England, provision was made for ministerial support by allowing 1500 lbs. of tobacco and 16 barrels of flour, per annum, to each minister, and by setting apart in each new borough a portion of land for a glebe. Tithes were subsequently introduced. None but ministers who had received episcopal ordination could legally officiate in the colony. The officers and agents of the company, in their efforts to promote morality and religion, were exhorted "to employ their utmost care to advance all things appertaining to the order and administration of divine service according to the form and discipline of the church of England, carefully avoiding all factious and needless novelties, which only tend to the disturbance of peace and unity." As an endowment for a college, 10,000 acres of land were given and a large amount of money was collected. Great zeal in behalf of the conversion and education of the Indians was felt, and a strong hope was cherished that the contemplated institution would be very useful to them. But, in 1622, they conspired against the English and murdered many of them. This embittered the minds of the survivors, and arrested all plans for their advancement in education and religion. During the next half century, owing to political disturbances and other causes, religion greatly declined throughout the colony, so that in 50 parishes nearly all were destitute of glebe, parsonage, church, and minister. In 1685, Rev. James Blair came as missionary to Virginia, and having been appointed commissary to the bishop of London, exerted, during an administration of more than 50 years, a very great influence in restoring and enlarging the work of the Episcopal church. By his efforts the college of William and Mary was founded in 1692. The colony of Maryland, founded in 1633 by lord Baltimore, a Roman Catholic, with 200 families and several priests, offered free admission "to every person professing to believe in Jesus Christ." At lord Baltimore's death, in 1676, there were 10 counties and 16,000 inhabitants, the majority of whom were Protestants. On the accession of William of Orange, "a Protestant revolution" took place, and a royal governor was sent into the colony. In 1692, the church of England was established by law, the province was divided into 30 parishes, and tithes for the support of the Episcopal ministers were imposed on every inhabitant, no matter what were his religious preferences and creed. Dr. Thomas Bray was appointed commissary of the bishop of London for the province of Maryland. By his efforts before leaving England, the societies "for promoting Christian knowledge," and "for the propagation of the gospel in foreign parts," were established. After his arrival in Maryland he entered with zeal into his work, and was active in having a bill passed, in which it was provided, "that the Book of Common Prayer and administration of the sacraments, with the rites and ceremonies of the church according to the use of the church of England, the psalter, and psalms of David, therein contained, be solemnly read by all and every minister or reader in every church, or other place of public worship, within this province." Dr. Bray's actual residence in Maryland was soon interrupted, but his zeal in behalf of the church of England, as established therein, continued to the close of his life. At this date a majority of the inhabitants are reported as in communion with that branch of the church.—In the colonies of Carolina and Georgia Episcopal churches were planted and continued to flourish. New York was first colonized by the Dutch in 1615, and, in its religious opinions and forms, was Presbyterian. In 1664, it was seized by the English. After this, precedence was given to the church of England, and a tax levied for its

maintenance. Trinity church, New York city, was founded in 1696; its first rector, Rev. W. Vesey, was also for half a century commissary of the bishop of London. This corporation is now celebrated for its great wealth. In New Jersey the early settlers were principally Quakers, Presbyterians, and Congregationalists; but all other Christians enjoyed entire religious liberty. Missionaries of the society for propagating the gospel worked earnestly and with good effect in the establishment of Episcopal churches. In Pennsylvania the first church of this order was Christ's church, Philadelphia, founded in 1695; and at various other points missionaries of the English society engaged in successful work. The first colonies of New England, composed chiefly of English Puritans and Separatists, who came to America mainly to escape the restrictions and oppressions to which they had been subjected by church laws at home, sought to exclude episcopacy. Because of the severe measures adopted for this purpose, and from other causes, for 60 years after the landing of the pilgrims there were no Episcopal churches in New England. In 1679, Charles II., on the earnest representation of some of the inhabitants, had one built in Boston. From that time, through the efforts of the English missionary society, some progress was made. Missionaries were sent to various points, who were honest, faithful, and laborious in traveling and preaching the gospel. If the church of England had appointed bishops for the colonies, the growth of the denomination therein would doubtless have been greater and more rapid. II. *After the attainment of national independence.* At the beginning of the revolution there were in the middle and eastern states about 80 Episcopal ministers, many of whom had received a large part of their support from the English society. After the war, aid from that source was, of course, withdrawn. Many of the ministers and people had adhered to the crown during the struggle, and at its close left the country. Soon after, the landed endowments of the church of England in Virginia were lost, and Episcopalians were thrown on their own resources. They were poor, and their prospects were not bright. Two things were necessary—to secure union among the churches of the several states, and to obtain bishops. The first was accomplished by instituting the general convention, (q. v.), which has ever since been accepted as the governing body of the Episcopal church in the United States. The first American consecrated to the episcopal office was bishop Seabury, who, about 1785, obtained consecration from Scottish bishops. In 1789, William White and Samuel Provoost were consecrated, by the archbishop of Canterbury and other English bishops, as bishops of Pennsylvania and New York; and, in 1790, James Madison was consecrated, also by English bishops, as bishop of Virginia. In arranging the order of common prayer the English prayer-book was retained, with such alterations as the political changes had made necessary, and with some other modifications. It came into immediate use, and has since been maintained without material alteration. The Episcopal church having thus early organized itself in accordance with the new life of the country, soon began to increase. It is now strong in large cities and flourishing towns; has many adherents among persons of wealth and culture; and, aided by its complete and zealous organization of the church as a missionary society, not only continues to increase in the older states, but also extends its churches and dioceses over all parts of the land. It is steadily subdividing its dioceses, and is considering the expediency of arranging them all, according to geographical position, into four provinces, to be united under a council that shall meet once in a fixed term of years. The doctrine of the American Episcopal church is that of the church of England, "which while it receives the Holy Scriptures as the ultimate rule of faith, does not throw them open to the varying interpretations of every man's private judgment, but explains them by the creeds, by definitions of Christian doctrine made by the general councils, and by the aid of traditions which it believes to have come down through an unbroken line of teachers from the apostles themselves." Besides the general theol. sem., numerous schools and colleges are under the control of the diocesan bishops. The domestic and foreign missionary soc., the American church building fund commission, and the fund for the relief of widows and orphans of deceased clergymen are the only societies managed by the general convention; there are 16 other important societies connected with the church. There are 14 newspapers. The centennial anniversary of the consecration of bp. Seabury, the first bishop of Conn., was celebrated in many churches, 1884. At the general convention of 1883, it was proposed to erase the words *Protestant Episcopal* from the title page of the Book of Common Prayer, and although not carried, there are many who believe that the name will be dropped before long, and that the body will adopt as its legal title the designation of the *American Catholic* church. The most important work accomplished by this convention was the adoption, with certain amendments, of the report of the joint committee on liturgical additions to the Book of Common Prayer. No changes affecting the doctrines of the church were made; and many of the additions are taken from the original English book, while permission is granted to use shortened forms of service at missions, or where the same office is used more than once on the same day. The *Book Annexed*, embodying all the additions proposed by the committee, was published, 1885. Final action was taken on the subject by the general convention of 1886, which adopted many of the proposed changes.

The following general summary of statistics for 1895-6 is taken from the *Protestant Episcopal Almanac* for 1897:

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|---|-----------------|
| Dioceses in the United States | 58 |
| Missionary Jurisdictions in the United States..... | 21 |
| Missionary Districts in Foreign Lands..... | 7 |
| Clergy (Bishops, 83; Priests and Deacons, 4,640)..... | 4,723 |
| Parishes and Missions | 6,286 |
| Candidates for Holy Orders | 563 |
| Ordinations: Deacons. | 189 |
| Ordinations: Priests..... | 165 |
| Baptisms..... | 64,168 |
| Confirmations | 45,154 |
| Communicants | 641,145 |
| Marriages | 17,779 |
| Burials..... | 33,300 |
| Sunday-School Teachers | 45,236 |
| Sunday-School Scholars..... | 421,523 |
| Grand Total of Contributions | \$12,685,880.01 |

EPISCOPAL SYSTEM, in the Roman Catholic church, is the name given to the theory which vests the supreme ecclesiastical power in the whole body of bishops. It was urged most powerfully in the conflicting papal elections which occurred during the 14th century. All who adopted it declared that the general councils of the church were above the pope. Among this class the university of Paris and the Gallican church were conspicuous. The theory continued to spread, also, in Germany, where Nikolaus von Hontheim, co-adjutant bishop of Treves, was one of its chief supporters, and, in 1763, wrote his celebrated book concerning it. In 1785, the archbishops of Treves, Mayence, Cologne, and Salzburg, agreed in demanding from the pope the restoration of the episcopal privileges which had formerly been vested in the German archbishops. But the declaration of the infallibility of the pope by the Vatican council has put an end to all debate on the subject.

EPISCOPIUS, SIMON (whose Dutch name was Bisschop), the head of the Arminian party after the death of Arminius, was b. at Amsterdam in 1583, studied at Leyden, took his degree in 1606, and was ordained pastor of the village of Bleywyck near Rotterdam in 1610. In the following year, the states-general, with the intention of putting an end to the agitations created by the controversies between the Gomarists or Calvinistic party and the Arminians or Remonstrants, ordered a conference to be held in their presence at the Hague between six ministers of each party. E. was one of the six charged with the advocacy of Arminianism, and highly distinguished himself by his good temper, ability, and learning. In 1612, the curators of the university of Leyden appointed him professor of theology in the room of Gomar, who had gone to Seeland. This enraged the leaders of the orthodox party, who unscrupulously accused him of Socinianism, and of having entered into an alliance with the Roman Catholics for the destruction of Protestantism. By this means the fanaticism of the populace was roused against him; he was insulted and abused in the street, and on one occasion narrowly escaped being stoned to death. The house of his brother in Amsterdam was also sacked, under the pretext that it was a rendezvous of the Remonstrants. In 1618, occurred the famous synod of Dort (q.v.). E. was present, along with several other Arminians. The Calvinists, who happened to be in an overwhelming majority, would not allow him to speak; they told him that the synod was met not to discuss, but to judge; and, in fact, the whole proceedings exhibited as revolting a specimen of high-handed tyranny as any on record, even among ecclesiastical tribunals. Expelled from the church, and banished from the country, E. betook himself first to Antwerp, and afterwards to Rouen and Paris, but in 1626 returned to Rotterdam, where the *odium theologicum* against his party had become less virulent. Here he married in 1630. Four years after, he was made primarius professor of divinity in the newly-established college of the Remonstrants in Amsterdam. He died in 1643. His chief works are his *Confessio Remonstrantium* (1621) and *Apologia pro Confessione* (1629).

EPISTATES, the title of the presiding officers of the great councils of the Athenians, the Ecclesia and the Council of Five Hundred. The E. held office for only one day at a time.

EPISTAXIS, hemorrhage from the nose. For full treatment see NOSTRILS, DISEASES OF THE.

EPISTLE. The lesson in the church service called the E., derives its name from being most frequently taken from the apostolic epistles, although it is sometimes also taken from other parts of Scripture. This part of the service is believed to be as old as the 6th century.

EPISTLE SIDE OF THE ALTAR, the left side of the altar or communion table, looking from it, at which in the church service the epistle of the day is read. It is of lesser distinction than the right or gospel side, and is occupied by the clergyman of lower ecclesiastical rank. The reader of the epistle was in former times called the epistler.

EPISTLES, **SPURIOUS**, have been forged by various unknown authors, and for a variety of purposes. Many of them are lost, but a considerable number are extant, among which are the following: 1. *The Epistle of Paul to the Laodiceans*.—In the early

part of the 2d c. there was a Greek epistle with this title. It was received by the heretic Marcion, but is generally believed to have been a forgery founded on Paul's direction to the Colossians to read the epistle from Laodicea. "Some," said Theodoret in the 5th c., "imagine Paul to have written to the Laodiceans, and accordingly produce a certain forged epistle; but the apostle does not say *to*, but *from*, the Laodiceans." There is also an epistle with this title now extant in Latin, which, however, cannot be proved to be a translation of the former, but has, probably, a comparatively modern origin. It was first published in 1517, but existed in manuscript, at an earlier date, in the library of the Sorbonne. 2. *The Third Epistle of Paul to the Corinthians*.—Many persons have inferred from several passages in the two genuine epistles that Paul wrote a third which is not in the canon. There is still extant in the Armenian language an epistle professedly from the Corinthians to the apostle, with his reply. It was quoted in the 3d c. by Gregory, the illuminator, first bishop of Armenia, but has not been noticed by any ancient Greek or Latin writer. 3. *The Epistle of Peter to James* was forged in very early times, and is supposed to have been used as an introduction to the *Preaching of Peter*, which was held in great esteem by some early Christian writers, and was considered a genuine work by Clement of Alexandria (about the end of the 2d c.), Theodotus of Byzantium, and others. It was used by the heretic Heraclion in the 2d century. Origen (first half of 3d c.) did not receive it as the work either of Peter or of any other inspired person. Its author, perhaps, was one of the Ebionites at the opening of the 2d century. 4. *The Epistles of Paul and Seneca* comprise eight long letters in Latin from the philosopher Seneca to the apostle Paul, and six from Paul to Seneca in reply. They are certainly ancient. Jerome (about the end of the 4th c.), supposing them genuine, valued them highly, and was led by them to place Seneca in his catalogue of saints. At that time they were read by many. Augustine (about the same time) also speaks of them as genuine. Some learned men of more modern times accept them, but by far the greater number pronounce them spurious. 5. *The Epistle of Publius Lentulus*, written from Jerusalem to the Roman senate. It contains (but with many variations of the text) the following oft-quoted description of the personal appearance of Christ: "A man of tall stature, good appearance, and a venerable countenance, such as to inspire beholders with both love and awe. His hair, worn in a circular form and curled, rather dark and shining, flowing over the shoulders, and parted in the middle of the head, after the style of the Nazarenes. His forehead smooth and perfectly serene, with a face free from wrinkle or spot, and beautified with a moderate ruddiness, and a faultless nose and mouth. His beard full, of an auburn color, like his hair, not long but parted. His eyes quick and clear. His aspect terrible in rebuke, placid and amiable in admonition, cheerful, without losing its gravity: a person never seen to laugh, but often to weep." Dr. Edward Robinson, after a careful examination of the whole subject, comes to the following judgment: "*In favor of the authenticity of the letter we have only the purport of the inscription. There is no external evidence whatever. Against its authenticity we have the great discrepancies and contradictions of the inscription; the fact that no such official person as Lentulus existed at the time specified, nor for many years before and after; the utter silence of history in respect to the existence of such a letter; the foreign and later idioms of its style; the contradiction in which the contents of the epistle stand with established historical facts; and the probability of its having been produced at some time not earlier than the 11th century.*" 6. *An Epistle of the Virgin Mary*, said to have been written in Hebrew, but extant in Latin, addressed to the Christians of Messina, and giving name to the metropolitan church of "Our Lady of the Letter." 7. *An Epistle of the Virgin* to the Florentines. 8. *From the same* to Ignatius, with his reply. There exist also spurious letters attributed to Plato, Aristotle, and Cicero.

EPISTOLÆ OBSCURORUM VIRORUM (Lat. Letters of Obscure Men) is the title of a collection of satirical letters which appeared at the commencement of the 16th c., and professed to be the composition of certain ecclesiastics and professors in Cologne and other places in Rhenish Germany. They were directed against the scholastics and monks, and lashed with merciless severity their doctrines, writings, morals, modes of speech, manner of life, follies and extravagances, and thus helped in no small degree to bring about the reformation. The controversy of Reuchlin with the baptized Jew, Pfefferkorn, concerning Hebrew punctuation, gave the first occasion to the *Epistolæ*, and it is probable that their title itself was suggested by the *Epistolæ Clarorum Virorum ad Reuchlinum Phorcensum* (1514). They were addressed to Octuin Gratus in Deventer, who was by no means so complete an ignoramus as might be supposed from this circumstance, but who had made himself odious to the liberal minds of the time by his arrogant pretension and his determined hostility to the spirit of his age. On the first appearance of the work, it was fathered on Reuchlin; afterwards, it was ascribed to Reuchlin, Erasmus, and Hutten. More recent investigators have inclined to the belief, that the *first* part, which appeared at Hagenau in 1515 (but professedly at Venice), was the production of Wolfgang Angst, a learned and witty book-printer of that town; but, latterly, doubt has also been expressed whether even he had anything to do with the *Epistolæ*. In the composition of the second part (published in 1519), after Ulrich von Hutten, Erotus Rubeanus had the most considerable share. The circumstance of the *Epistola* being placed in the catalogue of forbidden books by a papal bull, helped to spread it not a

little. Among the numerous editions of the work (1643, 1703, 1827, etc.), the best is that by Böcking (1858; 2d ed. 1864). See Mark Pattison's *Essays* (1889).

EPISTOLER, or **EPISTLER**, an officer in the English church, who, in accordance with the canon, assists the celebrant in the administration of holy communion. His duty is to read the liturgical epistle, and from this fact he derives his name. See **GOSPELERS**.

EPISTYLIUM, or **EPISTYLE** (Gk. *Epistulion*; from *Epî*, upon, and *stylos*, a pillar), a huge lintel of stone or wood, resting upon the abacus of the capital of a column or pillar. Instead of epistylum the term *architrave* (q. v.) is now employed. See **COLUMN**.

EPI TAPH (Gr. *epî*, upon, and *taphos*, a hillock, mound, or other monument placed over a grave). From originally signifying a monument, this word is now used exclusively to designate the inscription commemorative of the deceased which is placed upon the monument. This perversion may in some measure have arisen from the remembrance of the funeral orations which the ancients were in the habit of pronouncing at funerals. But the E., in its stricter sense, was well known to the classical nations of antiquity; and, indeed, by every people a brief commemoration of the heroic actions or personal virtues of their illustrious dead has been regarded as one of the worthiest occupations of the faculties of the living. As epitaphs were not only engraved on the most enduring substances, but from their brevity were easily preserved in the memory and orally transmitted, wherever we find the literature of a people at all we are pretty sure to discover specimens of their epitaphs. Pettigrew has translated several from Egyptian sarcophagi (Bohn's edition, p. 5), but they are of no great interest. Herodotus (vii. 228) has preserved to us those which the Amphictyons caused to be inscribed on the columns which they raised in honor of the heroes of Thermopylæ, and that which Simonides, from personal friendship, placed on the tomb of the prophet Megistias. The general inscription for the whole of them was to this effect: "Four thousand from Peloponnesus once fought on this spot with three hundred myriads;" and that which was special to the Spartans was still more memorable: "Stranger, go tell the Lacedæmonians that we lie here obedient to their commands." The *Anthologia Græca*, edited by Brunk, and subsequently by Jacobs, contains the largest collection of Greek epitaphs: of these many were translated and published by Bohn in 1854, under the editorial care of Mr. George Burges. Of Roman epitaphs, every antiquarian museum even in this country presents numerous examples; for the form in which they were conceived was adopted by our own Romanized forefathers, and many a stone bearing the well-known *D. M. (Dis Manibus)*, or *Siste Viator*, probably covered the remains of those whose veins never contained a drop of Roman blood. A very interesting collection of early Christian epitaphs will be found in Dr. Charles Maitland's *Church in the Catacombs*, published in 1846. The naturally epigrammatic turn of the French mind peculiarly adapts it for this species of composition, and in French collections, such as the *Recueil d'Epitaphes*, very felicitous examples are to be found both in Latin and in French. Of the former may be mentioned the "Tandem felix!" which the count de Tenia, who had enjoyed every form of temporal prosperity, caused to be engraved on his tomb; and of the latter, the touching E. to a mother, "La première au rendez-vous." A large portion of the earlier monuments, and consequently of the epitaphs of this country, were destroyed at the reformation, and subsequently by the iconoclastic rage of the Puritans and Presbyterians. But when we come down to a later date, the literature of no people, either ancient or modern, can vie with our own in this peculiar branch, for whilst English epitaphs possess the point and terseness without which no E. can be successful, they exhibit a feature almost unknown in those of other nations—that, viz., of wit, or more properly speaking, perhaps, of humor. It seems as if the wittiest people in the world, as the English unquestionably are, had found it impossible to confine their raillery to the living, and accordingly we find that the harmless peculiarities of the dead have often been hit off on a tombstone, with a felicity which has rendered immortal what otherwise the next generation must have forgotten. Of this class of epitaphs our collections present an almost infinite variety. There are many excellent old collections of epitaphs, such as the *Thesaurus Epitaphiorum* of Philip Labbe, Paris, 1666. Of modern ones, the best is that of Pettigrew, published by Bohn.

EPI THALA MIUM was a species of poem which it was the custom among the Greeks and Romans to sing in chorus near the bridal-chamber (*thalamus*) of a newly-married couple. Anacreon, Stesichorus, and Pindar composed poems of this kind, but only scanty fragments have been preserved. The epithalamium of Peleus and Thetis by Catullus is one of the finest specimens of Latin poetry extant; but probably the most gorgeous epithalamium in all literature, is that of the English poet Spenser. A collection of Greek and Latin epithalamia is to be found in Wernsdorf's *Poetæ Latini Minores* (4th vol., part 2).

EPI THELIO MA, a variety of cancer, attacking surfaces covered with epithelium or epidermis. See **CANCER**.

EPI THE LIUM is the term applied in anatomy to the cell-tissues which, in layers of various thickness, invests not only the outer surface of the body, and the mucous membranes connected with it—as, for example, those of the nose, lungs, intestinal canal etc.—but also the closed cavities of the body, such as the great serous membranes, the ventricles of the brain, the synovial membranes of joints, the interior of the heart

and of the blood-vessels proceeding to and from it, the ducts of glands, etc.

The thickness of this tissue varies extremely with the position in which it occurs. In some parts it consists of numerous strata of cells, collectively forming a layer of more than a line in thickness; in other parts, it is composed of only a few strata, or often of only a single stratum of cells, and can only be detected by the microscope.

The cells of which the E. is composed are usually soft nucleated cells; they may be rounded, polygonal, fusiform, cylindrical, or conical in shape, and sometimes they possess vibratile cilia, the appearance and uses of which will presently be explained.

In his *Manual of Human Histology*, Kölliker adopts the following arrangement. He considers (a) E. in a single stratum, and (b) E. in many layers.

(a) *Epithelium in a single stratum* may be composed of:

1. *Rounded, polygonal cells*, constituting the variety known as pavement or tessellated E., and occurring as an investment of the serous membranes of most synovial membranes, of the lining membrane of the heart and of the veins, of the canals of glands, etc.

2. *Fusiform, superficially united cells* (fusiform E.), as the E. of the arteries and of many veins.

3. *Cylindrical cells* (cylinder E.), as in the intestine from the stomach to the termination of the alimentary canal, in the excretory ducts of all the glands opening into the intestine, etc. Various illustrations of this cylinder E. are given in the article DIGESTION, ORGANS AND PROCESS OF.

4. *Cylindrical or conical ciliated cells*, as the E. of the more minute bronchial tubes, of the nasal cavities, and of the uterus.

5. *Rounded ciliated cells*, as the ciliated pavement E. of the ventricles of the brain in the fetus.

(b) *Epithelium in many layers* may be composed of:

1. *Cylindrical or rounded cells below, and more or less flattened cells above*. This is termed laminated pavement E., and occurs in the mouth, lower part of pharynx, esophagus, bladder, etc.

2. *Rounded cells below, more elongated ones in the middle, and ciliated conical ones above*. This is termed laminated ciliary E., and occurs in the larynx, trachea, and larger bronchial tubes, in the greater part of the nasal cavity, etc.

In all the varieties of E., the layer of external cells is being constantly disintegrated and replaced by the layer immediately beneath.

The uses of the chief varieties of E., especially of ciliated E., require some notice.

The polygonal or pavement E. mainly acts like the epidermis, as a protecting medium to the soft parts beneath.

The cylindrical E. additionally takes an active part in the process of secretion. Illustrations of the function of the cells forming this variety of E. are given in the articles CELLS, ANIMAL: DIGESTION, ORGANS AND PROCESS OF; and the subject will be further noticed under the head SECRETION.

In connection with ciliated E., we must notice *ciliary motion* generally, in so far as it occurs in the animal kingdom. Certain surfaces which are lubricated by a fluid, are covered with a multitude of hair-like processes of extreme delicacy and minuteness (their length varying from $\frac{1}{1000}$ to $\frac{1}{12500}$ of an inch), which from their shape are termed *cilia*, from *cilium*, an eyelash. During life, and for a certain period after death, these filaments exhibit a remarkable movement, each cilium bending rapidly in one direction, and rapidly returning to its original position (according to Krause, these movements range from 190 to 230 in a minute). On examining a ciliated surface with a high magnifying power, the motion presents an appearance somewhat resembling that of a corn-field agitated by a steady breeze. Any minute objects coming in contact with the free extremities of the cilia are urged onward in the direction of the predominant movement: and the best method of observing the course of the ciliary current is to sprinkle the surface with a little powdered charcoal, grains of which may speedily be seen to move onwards in a definite direction.

An easy way to observe this phenomenon is to detach, by scraping with a knife, a small piece of E. from the back of the throat of a living frog. The scales, moistened with water or serum, will continue to exhibit the movement of their adherent cilia for a very considerable time, provided the piece be kept duly moistened. On one occasion, a piece prepared in this way by Mr. Bowman and Dr. Todd exhibited motion for 17 hours; and it would probably have continued doing so for a longer time, had not the moisture around it evaporated; and if the E. is not removed from the body of an animal that had been killed, the motion continues much longer. In a turtle, after death by decapitation, it lasted, in the mouth, 9 days; in the trachea and lungs, 13 days; and in the esophagus, 16 days. In man and mammals, it seldom lasts 2 days, and usually ceases much sooner. The necessary condition for their movement appears to be the integrity of the cells to which they are attached; for as soon as these shrink up for want of moisture, or undergo any physical change, the cilia cease their characteristic action.

This phenomenon exists very widely throughout the animal kingdom. Dr. Sharpey, in his article CILIA* (published upwards of 40 years ago), notices its occurrence in the

* In the *Cyclopædia of Anatomy and Physiology*.

infusoria, in polyps and their ova, in acalephæ, actiniæ, echinodermata, annelida, mollusca, and the molluscoids (e.g., ascidians), in reptiles, birds, and mammals. Since the date of that article, it has been discovered in sponges, and in one or two exceptional cases in fishes; but it has never been found in any part of the body of articulates (crustaceans, insects, or arachnidans). The parts on which it occurs are (1) the skin or surface of the body, (2) the respiratory, (3) the alimentary, and (4) the genito-urinary systems; and it has been observed in the ova of numerous classes of animals, from reptiles downwards to infusoria. In most of the parts in which we observe it, its use appears to be of a mechanical nature—viz., to convey the fluids or other matters along the surfaces on which the cilia exist, or, as in the infusoria, to carry the entire animal through the water.

1. Cilia have been found on the external surface in batrachian larvæ, in mollusca, annelida, echinodermata, actiniæ, medusæ, polypi, and infusoria. In most cases, their function is respiratory, but in many instances it is also locomotive or prehensile.

2. Ciliary motion has been observed on the lining membrane of the air-passages of mammals, birds, and reptiles, where, whatever may be its other uses, it serves to convey the secretions along the membranes, together with any foreign matters that may be present. It exists also on the external gills of batrachian larvæ, and on the respiratory organs of mollusca and annelida. The cilia which exist externally on still lower animals without separate respiratory organs, assist in the respiratory process, by renewing the water on the surface.

3. It occurs in the mouth, throat, and gullet of various reptiles, and the alimentary canal of the mollusca, echinodermata, many annelida, and acalephæ. It is not easy, as Dr. Sharpey observes, to see the purpose of the motion in all these cases. In some, it may merely convey secreted matters along the surface of the lining membrane; and in others it seems to serve in place of ordinary deglutition, to carry food into the stomach.

4. It is observed on the surface of the reproductive organs of mammals, birds, and reptiles. From the direction of the current being from without inwards, the office of the cilia may be to hurry down the ovum, in addition to removing the mucous secretion of the membrane.

In reptiles and fishes, ciliary motion exists at the neck of each uriniferous tube. The movement is directed towards the tube, and favors the flow of the watery portion of the secretion towards it.

There are some situations, both in man and the lower animals, in which it is difficult to determine what functions the ciliary motion can perform, as, for example, in man, in the ventricles of the brain; and in the frog, in the closed cavities of the pericardium and peritoneum.

EPIZOÏA. This term is applied to those parasitic creatures which live on the bodies of other animals, and derive their nourishment from the skin. Our space will only allow of our noticing those that infest man. They may be divided into two groups: (1) Those which live upon the surface of the skin, and (2) those which live in the skin. Fleas, lice, bugs, ticks, etc., belong to the first group; the itch-insect or *sarcoptes*, the pimple-mite or *demodex folliculorum*, and possibly some other species of the *acarida*, to the second.

In a zoological point of view, all the E. that infest the human subject are insects or arachnidans. The parasitic insects are: I. *Pulicida*, or fleas, including—1. The common flea, or *pulex irritans*; 2. The sand-flea, or *pulex penetrans*, known also as the chigo, chigger, etc. II. *Acanthida*, or soft bugs, including the common bed-bug or *acanthia* (s. *cimex*) *lectularia*. III. *Pediculida*, or lice, including—1. The common louse, or *pediculus capitis*; 2. The body louse, or *pediculus vestimenti*; 3. The crab louse, or *pediculus* (s. *phthirius*) *pubis*; 4. The louse occurring in phthiriasis, or *pediculus tabescentium*.

The parasitic arachnidans belong to the order of *acarida*, or mites; indeed, most of the animals forming the different families of this order lead a parasitic existence. We have—I. *Demodicida*, including the pimple-mite or *demodex* (s. *acarus*) *folliculorum* (the dog and the sheep possess each a special demodex. II. *Sarcoptida*, including the itch-mite or *sarcoptes* (s. *acarus*) *scabiei*. (Most of our domestic animals seem to be infested by a special sarcoptes, the species of which are numerous.) III. *Ixodida* or ticks, including—1. The American tick or *ixodes hominis* (common in Brazil); 2. The common wood-tick (dog's tick), or *ixodes ricinus*. There are probably many species of ixodes which are occasionally found on man. IV. *Gamasida*, or beetle lice, including—1. The bird-mite, or *dermanyssus avium* (occasionally found on sickly persons); 2. The Miana bug, or *argas persicus* (common in some parts of Persia, and especially at Miana); 3. The chinch bug, or *argas chinche* (occurring in Columbia). V. *Orobatiida*, or grass-lice, including the harvest-bug, or *leptus autumnalis*. See the articles BUG, FLEA, ITCH-MITE, LOUSE, TICK.

EPIZOÏTICS (Gr. *epi*, upon, and *zōon*, an animal) are diseases of animals which manifest a common character, and prevail at the same time over considerable tracts of country. Like epidemics, they appear to depend upon some peculiar and not well ascertained atmospheric causes; where the cases are neglected or overcrowded, they also frequently become contagious; they are apt to take on a low type of fever, and

are better treated by supporting than by reducing remedies. Influenza in horses, and pleuro-pneumonia and vesicular epizootic in cattle, are examples.

EPOCH, in astronomy, is an abbreviation for "longitude at the E.," it means the mean heliocentric longitude of a planet in its orbit at any given time—the beginning of a century, for instance. The E. of a planet for a particular year is its mean longitude at mean moon, on Jan. 1, when it is leap year, and on Dec. 31 of the preceding year, when it is a common year. The E. is one of the elements of a planet's orbit.

EP' OCH, in chronology. See **CHRONOLOGY**.

EP' ODE is the last part of the chorus of the ancient Greeks, which they sung after the strophe and antistrophe, when the singers had returned to their original place. The E. had its peculiar measure of syllables and number of verses. See **CHORUS**.

EPPING, a t. in the w. of Essex co., England, in a pleasant healthy situation, at the n. end of E. forest, 16 m. n.n.e. of London. It has a very irregular appearance. Pop. '91, 2565. It is noted for its cream, butter, sausages and pork. It sends large quantities of butter to London. E. royal forest, formerly under the name of Waltham forest, where the ancient kings enjoyed much sport, covered all Essex, and extended almost to London. It is now limited to a comparatively small area in the s. w. part of the county and only a small part of this tract is in wastes and woods, the rest being now inclosed as private property. In the forest, 5 m. from E. is queen Elizabeth's hunting-lodge. Separated by the river Roding from E. forest is Hainault forest, lately disforested. Here for many centuries a fair was held under the enormous Fairlop oak, not now existing, and a stag was yearly turned out in the forest on Easter Monday, for the amusement of the public. At the cost of about half a million of money, 5600 acres of E. forest were bought by the corporation of London, and declared free to the public in 1882.

EPROUVETTE is a machine for proving or testing the strength of gunpowder. It was invented or suggested in the last century by Robins, but was greatly improved by Dr. Hutton.

The *gun* E. determines the strength of gunpowder by the amount of recoil produced. A small gun, usually a "half-pounder," is fixed to the lower end of an iron rod; its base being adjusted to an arm projecting from the rod; or else it is suspended from an iron frame. A horizontal steel axis is fixed to the rod or frame about which the gun may vibrate. A pointed iron rod or style projects downwards from the lower side of the gun, and touches a groove filled with soft wax; the groove is so shaped that, when the gun recoils, the point cuts a path for itself along this wax; and the length of this path determines the amount of recoil. Sometimes a brass graduated arc with an index is used instead of the pointed style and the waxed groove; but the principle of action is just the same. On the arc the recoil should vary from 26° for new fine-grain powder to 20° 5' for old powder of coarse grain. This system of proof is resorted to annually at minor and foreign stations for the proof of all powder in store, to ascertain the amount of deterioration; five rounds constitute the minimum proof. Before the E. is resorted to, the powder must pass the test of specific gravity, by weighing not less than 55 lbs. to the cubic foot.

The *mortar* E. determines the strength of gunpowder by the distance to which a ball is projected, instead of the distance to which the piece recoils. It is generally a mortar of 8-inch bore, in which 2 to 4 ozs. of powder is employed to propel an accurately turned iron shot to a distance of about 120 yards. Other things being equal, the strongest gunpowder sends the shot to the greatest distance; and this is the usual mode adopted in testing gunpowder supplied to the government by various contractors.

The ordinary E. is an instrument shaped like a small pistol without a barrel, and having its breach chamber closed by a flat plate connected with a strong spring. On the explosion of the powder against the plate, it is driven back to a distance indexed according to the strength of the powder, and is retained at its extreme state of propulsion by a ratchet wheel.

EPSOM (said to have originally been Ebbasham) is a small market t. on the margin of the Banstead downs in Surrey, 15 m. s.s.w. of London by road, and 14 m. by the London and Southwestern railway. The famed sulphate of magnesia springs of E. gave their name to the E. salts formerly manufactured from them. This manufacture has been abandoned from the ease with which these salts can be made artificially. The royal medical college, erected on the Downs, and established in 1851, provides education for about 170 boys, the sons of medical men, and affords a home to decayed members of the profession and their widows. Pop. '91, 8417. On the Downs, 1½ m. s. of the town, the famous E. horse-races are held yearly. They are said to have been instituted by Charles I., but have become of greater importance since the institution of the Derby stakes in 1780 (see **DERBY DAY**). The races last four days, and as many as 100,000 persons often assemble to witness the most important of them.

EPSOM SALT, or **SULPHATE OF MAGNESIA** ($MgSO_4 + 7H_2O$), occurs not only in the water of mineral springs, as at Epsom, Seidlitz, and many other places; but also as an efflorescence on the surface of various rocks, sometimes along with alum, as at Hurlet, in Renfrewshire; and on the ground, as in some parts of Spain and of the Russian

steppes. It sometimes occurs snow-white and very pure, sometimes discolored by impurities; and is either in the form of fine thread-like crystals, or in crusts, flakes, granules, etc. Its crystals are prisms, almost rectangular. For purposes of commerce, it is obtained by the action of dilute sulphuric acid upon magnesian limestone. See **MAGNESIUM**.

E. S. is a well-known purgative remedy much in use in household medicine. It may be given in doses from 2 drams to 1 oz., according to the effect required, in a tumbler of water.

EPWORTH LEAGUE, a society formed in May, 1889, in the Methodist Episcopal church by the union of five societies then existing. Its objects are to promote the religious feeling of the young members and friends of the denomination, and fit them for works of charity and help. Its weekly organ is the *Epworth Herald*. On November 10, 1896, it reported 21,304 chapters, with a membership of 1,500,000. Among its features are the weekly prayer meeting and the "intellectual" and "mercy and help" departments. In 1896 the president was Bishop R. K. Hargrove, Nashville, Tenn.

EQUABLE MOTION is that by which equal spaces are passed over in equal times.

EQUALITY. See **LIBERTY, EQUALITY, FRATERNITY**.

EQUATION, ANNUAL, one of the most conspicuous of the subordinate fluctuations in the moon's motion, due to the action of the sun, which increases with its proximity to the earth and her satellite. It consists in an alternate increase and decrease in her longitude, corresponding with the earth's situation in its annual orbit, i.e., to its angular distance from the perihelion, and therefore having a year instead of a month, or aliquot part of a month, for its period. For an explanation of the mode of its production, the reader is referred to Herschel's *Outlines of Astronomy*, art. 738, *et seq.* The subject is too abstruse for explanation in this work.

EQUATION, DIFFERENTIAL, is an equation involving differential co-efficients (see **CALCULUS**); such is $\frac{d^2y}{dx^2} + a \frac{dy}{dx} = x$; from which it is required to find the relation between y and x . The theory of the solution of such equations is an extension of the integral calculus, and is a branch of study of the highest importance.

EQUATION, FUNCTIONAL. See **FUNCTIONS**.

EQUATION, LUNAR. See **LUNAR THEORY**.

EQUATION OF THE CENTER. If the earth moved uniformly round the sun in a circle, it would be easy to calculate its longitude or distance from the line of equinoxes at any time. One year would be to the time since the vernal equinox as 360° to the arc of longitude passed over. But the orbit of the earth is not circular, nor is its motion uniform; the orbit is slightly elliptical, and the motion is quicker at perihelion than at aphelion. The true rule, then, for ascertaining the earth's longitude is contained in the following proportion: one year is to the time elapsed as the whole area of the earth's orbit is to the area swept over by the radius vector in the time. This is a deduction from Kepler's law (see **CENTRAL FORCES**), that, in planetary motion, equal areas (not angles) are swept over in equal times. The area swept over being ascertained from the laws of the earth's motion, and the elements of its orbit, it is a question of geometry to ascertain the angle corresponding to the area, or the true longitude. In astronomy, the longitude, as calculated on the supposition that the earth moves uniformly in a circle, is called the *mean longitude* of the earth; and it happens, from the orbit being, as we said, but slightly different from a circle, that the mean and true longitude differ but slightly. The quantity by which the true and mean longitudes differ is called the *equation of the center*; and this is sometimes to be added to, and sometimes to be subtracted from the mean longitude, to obtain the true; and sometimes it is zero.

EQUATION OF EQUINOXES is the difference between the true position of the equinoxes, and the position calculated on the supposition that their motion is uniform. See **PRECESSION**.

EQUATION OF LIGHT. In astronomical observations, the visual ray by which we see any body is not that which it emits at the moment we look at it, but which it *did* emit some time before, viz., the time occupied by light in traversing the interval which separates it from us. If, then, the body be in motion, its aberration, as due to the earth's velocity, must be applied as a correction, not to the line joining the earth's place at the moment of observation with that occupied by the body, (as seen) at the same moment, but at that antecedent moment when the ray quitted it. Hence is derived a rule applied by astronomers for the rectification of observations made on a moving body, viz., from the known laws of its motion and the earth's, calculate its relative angular motion in the time taken by light to pass from it to the earth. This motion is the total amount of its apparent displacement. Its effect is to displace the body in a direction contrary to its apparent motion, an effort one part of which is due to aberration, properly so-called (see **ABERRATION**) resulting from the composition of the motions of the earth and of light, and another part to the fact of the passage of light occupying time. The *equation of light* is the allowance to be made for the time occupied by the light in traversing a variable space.

EQUATION OF PAYMENTS. The problem considered under this head in books of arithmetic is to find a time when, if a sum of money be paid by a debtor, which is equal to the sum of several debts payable by him at different times, no loss will be sustained by either the debtor or creditor. The rule generally given is as follows: Multiply each sum due by the time at which it is payable, and then divide the sum of the products by the sum of the debts: the quotient is the equated time. For example, if £10 be due at one month, and £20 at two months, find as an equivalent when the whole £30

may be paid at once. Ans. $\frac{10 \times 1 + 20 \times 2}{30} = 1\frac{2}{3}$ months. This rule is, however, incorrect where the debts are unequal, because it takes no account of the balance of interest and discount. A correct rule for the case of two debts and simple interest is subjoined. Let d and D denote the debts, t and T the times of payment, and r one year's interest on D . Then if $A = T + t + \frac{D+d}{dr}$, and $B = Tt + \frac{DT+dt}{dr}$, the equated time will be $\frac{1}{2}A - \frac{1}{2} \sqrt{A^2 - 4B}$. When three or more debts are concerned, the plan is to find by this formula the equated time for the first two, and then for their sum payable at their equated time, and the third, and so on. The common rule is, however, sufficiently correct for ordinary use.

EQUATION, PERSONAL, is a correction important chiefly in astronomical observations. Two observers, each of admitted skill, often differ in their record of the same event—as the passage of a star before the wires of a transit instrument—by a quantity nearly the same for all observations by those persons. This quantity is their relative personal equation. Each observer habitually notes the time earlier or later than the fact, by a minute and nearly uniform portion of a second. This quantity is his absolute personal equation. The correction is of no value when comparison is made between the records of the same observer, since each is in error in the same way, but it becomes important when the work of different observers is combined. The value and sign of the personal equation is found for each observer by the discussion of a large series of observations. It is a reliable correction for the work of only trained observers, who have, by long practice, acquired a habitual method of work which is uniform, even their errors conforming to a system.

EQUATIONS. An equation may be defined to be an algebraical sentence stating the equality of two algebraical expressions, or of an algebraical expression to zero. From another point of view, it is the algebraical expression of the conditions which connect known and unknown quantities. Thus (1), $xy = 24$, and (2), $x^2 + y^2 = 52$, are two E. expressing the relations between the unknown quantities x and y and known quantities. Generally, E. are formed from observations from which an object of inquiry may be inferred, but which do not directly touch the object. Thus, suppose we wish to ascertain the lengths of the sides of a rectangular board which we have no means of measuring, and that all the information we can get respecting it is, that it covers (say) 24 sq. ft., and that the square on its diagonal is (say) 52 sq. feet. From these facts, we can form E. from which we may determine the lengths of the sides. In the first place, we know that its area is equal to the product of its sides, and if we call these x and y , we have $xy = 24$, the first of the E. above given. Again, we know that the sum of the squares on the sides is equal to the square on the diagonal; hence, we have the second equation, $x^2 + y^2 = 52$. From these two E., we should be able to determine the values of x and y . The determination of these values is called the *solution* of the equations.

E. are of several kinds. Simple E. are those which contain the unknown quantity in the first degree; thus, $\frac{x}{2} + 3 = 4$, is a simple equation. Quadratic E. are those which contain the unknown quantity in the second degree: $x^2 + 5x - 36 = 0$, is a quadratic equation. Cubic and biquadratic E. involve the unknown quantity in the third and fourth powers respectively. For the higher E., there are no special names; they are said to be E. of the degree indicated by the highest power of the unknown which they contain. Simultaneous E. are those which involve two or more unknown quantities, and there must always be as many of them, in order to their determinate solution, as there are unknown quantities. The E. first mentioned—viz., $xy = 24 - x^2 + y^2 = 52$, are simultaneous equations. It may be mentioned, that in the course of solving such E., the principal difficulties encountered are always ultimately the same as in the solution of E. containing only one unknown quantity. For instance, in the E. just given, if we substitute in the second the value of y as given by the first, or $y = \frac{24}{x}$, we have $x^2 + \frac{(24)^2}{x^2} = 52$, which may be solved as a quadratic equation. The general theory of E., then, is principally concerned with the solution of E. involving one unknown quantity only, for to this sort all others reduce themselves. Indeterminate E. are such as do not set forth sufficient relations between the unknown quantities for their absolute determination, and which accordingly admit of various solutions. Thus, $xy = 24$ is an indeterminate equation, which is satisfied by the values $x = 3$, $y = 8$; or

$x = 6, y = 4$; or $x = 2, y = 12$. We require some other relation, such as $x^2 + y^2 = 52$, to enable us to fix on one of the sets of values, x and y , as those of x . For other kinds of E., see EXPONENT AND EXPONENTIAL, FUNCTIONS, and DIFFERENCE.

The object of all computation is the determination of numerical values for unknown quantities, by means of the relations which they bear to other quantities already known. The solution of E., accordingly, or, in other words, the evolution of the unknown quantities in them, is the chief business of algebra. But so difficult is this business, that, except in the simple cases where the unknown quantity rises to no higher than the second degree, all the resources of algebra are as yet inadequate to effect the solution of E. in general and definite terms. For E. of the second degree, or quadratic E., as they are called, there is a rigorous method of solution by a general formula; but as yet no such formula has been discovered for E. even of the third degree. It is true, that for E. of the third and fourth degrees general methods exist, which furnish formulas which express under a finite form the values of the roots. See CARDAN and CUBIC EQUATIONS. But all such formulas are found to involve *imaginary* expressions, which, except in particular cases, make the actual computations impracticable till the formulas are developed in infinite series, and the imaginary terms disappear by mutually destroying one another. What is called Cardan's formula, for instance (and all others are reducible to it), is in this predicament whenever the values of the unknown quantity are all real; and accordingly, in nearly all such cases, the values are not obtainable from the formulæ directly, but from the infinite series of which they are the compact expression. But though such formulæ as Cardan's are useless for the purpose of numerical computation, the search for them has led to most of the truths which constitute the general theory of E., and through which their *numerical solution* may be said to have been at last rendered effective and general. This method of numerical solution is a purely arithmetical process, performed upon the *numerical co-efficients* of E., and it is universally applicable, whatever the degree of the equation may be. With this method are connected the names of Budan, Fourier, Horner, and Sturm. We cannot here enter into an account of it; the reader should consult on the subject Young's *Theory and Solution of Algebraical Equations of the Higher Orders*; Peacock's *Treatise on Algebra*; and La Grange's work on *Numerical Solutions*.

The rules for the solution of the simpler forms of E. are to be found in all elementary text-books of algebra. It must suffice to notice here a few of the leading general properties of equations. By the roots of an equation are meant those values real or imaginary of the unknown which satisfy the equality; and it is a property of every equation to have as many roots and no more as there are units in its degree. Thus, a quadratic equation has two roots; a cubic equation, three; and a biquadratic, four. The quadratic equation $x^2 + 5x - 36 = 0$ has two roots, $+9$ and -4 , which will be found to satisfy it. Further, the expression $x^2 + 5x - 36 = (x - 9)(x + 4) = 0$; and generally if the roots of an equation

$$F(x) = x^n \pm A_{n-1}x^{n-1} \pm A_{n-2}x^{n-2} \pm \dots \\ \pm A_1x \pm A_0 = 0$$

(to which general form every equation of the n th degree can be reduced), are

$$\begin{aligned} & \pm a_1 \pm a_2 \pm a_3 \dots \pm a_n \dots \\ \text{then} \quad & (x \mp a_1)(x \mp a_2)(x \mp a_3) \dots \\ & (x \mp a_n) = F(x) = 0. \end{aligned}$$

Hence, and from observing the way in which, in the multiplication of these factors, the co-efficients

$$A_{n-1}, A_{n-2} \dots A_1, A^0$$

are formed, we arrive at the following important results:

A_{n-1} = the sum of the roots, with their signs changed.

A_{n-2} = the sum of the products of every two roots, with their signs changed.

A_{n-3} = the sum of the products of every three roots, with their signs changed.

A_0 = the product of the roots, with their signs changed.

The factors, it will be observed, are formed thus: If $+a_1$ be a root, then $x = a_1$, and $x - a_1 = 0$ is the factor. If the root were $-a_1$, then $x = -a_1$; and the factor would be $x + a_1 = 0$. Observing now the way in which, in multiplying a series of such factors, the co-efficients of the resulting polynomial are formed, we arrive at this: that a complete equation cannot have a greater number of positive roots than these *changes* of sign from $+$ to $-$ and from $-$ to $+$ in the series of terms forming its first member; and that it cannot have a greater number of negative roots than there are *permanencies* or repetitions of the same sign in proceeding from term to term. From the same source, many other general properties of E., of value in their arithmetical solution, may be inferred. The subject is, however, too vast to be more than glanced at here.

EQUATION OF TIME. It will be seen from the article EQUATION OF THE CENTER (q.v.) that the earth's motion in the ecliptic—or what is the same thing, the sun's apparent motion in longitude—is not uniform. This want of uniformity would of itself obviously cause an irregularity in the time of the sun's coming to the meridian on successive days; but besides this want of uniformity in the sun's apparent motion in the ecliptic, there is another cause of inequality in the time of its coming on the meridian—

viz., the obliquity of the ecliptic to the equinoctial. Even if the sun moved in the equinoctial, there would be an inequality in this respect, owing to its want of uniform motion; and even if it moved uniformly in the ecliptic, there would be such an inequality, owing to the obliquity of its orbit to the equinoctial. These two independent causes conjointly produce the inequality in the time of its appearance on the meridian, the correction for which is the equation of time.

When the sun's center comes to the meridian, it is apparent noon, and if it moved uniformly on the equinoctial, this would always coincide with *mean noon*, or 12 o'clock on a good solar clock. But from the causes above explained, mean and apparent noon differ, the latter taking place sometimes as much as $16\frac{1}{2}$ minutes before the former, and at others as much as $14\frac{1}{2}$ minutes after. The difference for any day, called, as we have said, the equation of time, is to be found inserted in ephemerides for every day of the year. It is nothing or zero at four different times in the year, at which the whole mean and unequal motions exactly agree—viz., about the 15th of April, the 15th of June, the 31st Aug., and the 24th December. At all other times, the sun is either too fast or too slow for clock-time. In the ephemerides above referred to, the sign + or — is prefixed to the equation of time, according as it is to be added to or subtracted from the apparent time to give the mean time. See NAUTICAL ALMANAC.

EQUATOR, CELESTIAL, is the great circle in the sky corresponding to the extension of the equator of the earth.

EQUATOR, TERRESTRIAL, the great circle on the earth's surface dividing the earth into the northern and southern hemispheres, and half way between the poles.

EQUATORIAL, an important astronomical instrument, by which a celestial body may be observed at any point of its diurnal course. It consists of a telescope attached to a graduated circle, called the declination circle, whose axis penetrates at right angles that of another graduated circle called the hour circle, and is wholly supported by it. The pierced axis, which is called the principal axis of the instrument, turns on fixed supports; it is pointed to the pole of the heavens, and the hour circle is of course parallel to the equinoctial. In this position, it is easy to see that a great circle of the heavens corresponding to the declination circle, passes through the pole, and is an hour circle of the heavens. The telescope is capable of being moved in the plane of the declination circle. If, now, the instrument be so adjusted that the index of the declination circle must point to zero when an equatorial star is in the center of the field of view of the telescope, and the index of the hour circle must point to zero when the telescope is in the meridian of the place, it is clear that when the telescope is directed to any star, the index of the declination circle will mark the declination of the star; and that on the other circle its right ascension. If the telescope be clamped when directed on a star, it is clear that, should the instrument be made to rotate on its principal axis with entire uniformity with the diurnal motion of the heavens, the star would always appear in the field of view. This motion of rotation is communicated to the instrument by clock-work. See *illus.*, CIRCLE, ETC., vol. III.

EQUERRY, in the household of the English sovereigns, is an officer of state under the Master of the Horse, whose principal function is to accompany the sovereign when riding in state. There are equerries also in attendance upon the royal princes.

EQUESTRIANISM. See HORSEMANSHIP.

EQUESTRIAN ORDER, or *EQUITES*. This body originally formed the cavalry of the Roman army, and is said to have been instituted by Romulus, who selected from the three principal Roman tribes 300 equites. This number was afterwards gradually increased to 3,600, who were partly of patrician and partly of plebeian rank, and required to possess a certain amount of property. Each of these equites received a horse from the state; but about 403 B.C., a new body of equites began to make their appearance, who were obliged to furnish a horse at their own expense. These were probably wealthy *novi homines*, men of equestrian fortune, but not descended from the old equites (for it should be observed that the equestrian dignity was hereditary). Until 123 B.C., the equites were exclusively a military body; but in that year Caius Gracchus carried a measure, by which all the *judices* had to be selected from them. Now, for the first time, they became a distinct order or class in the state, and were called *ordo equestris*. In 70 B.C., Sulla deprived them of this privilege; but their power did not decrease, as the forming of the public revenues appears to have fallen into their hands. After the conspiracy of Catiline, the E. O., which on that memorable occasion had vigorously supported the consul Cicero, began to be looked upon as a third estate in the republic; and to the title of *senatus populusque Romanus* was added *et equestris ordo*.

EQUESTRIAN STATUE, the representation of a man on horseback. Equestrian statues were awarded as a high honor to military commanders and persons of distinction in Rome, and latterly were, for the most part, restricted to the emperors, the most famous in existence being that of the emperor Marcus Aurelius, which now stands in the piazza of the capitol at Rome. It is the only ancient E. S. in bronze that has been preserved; an exemption which it probably owed to the fact, that for centuries it was supposed to

be a statue of Constantine. The action of the horse is so fine, and the air of motion so successfully given to it, that Michael Angelo is said to have called out to it "*Cammina!*"—(Go on, then!). It was originally gilt, and traces of the gilding are still visible on the horse's head. So highly is this statue prized, not only for its artistic but its historical value, that an officer used regularly to be appointed by the Roman government to take care of it, under the designation of the *custode del cavallo*. On the occasion of the rejoicings by which Rienzi's elevation to the tribuneship was celebrated in 1347, wine was made to run out of one nostril and water out of the other of this famous horse. The statue then stood in front of the church of St. John Lateran, near to which it was found, and a bunch of flowers has always been presented annually to the chapter of that basilica, in acknowledgment of ownership, since it was removed to its present site on the capitol. All European capitals are adorned, or disfigured, by numerous equestrian statues, London belonging pre-eminently to the latter category.

EQUIANGULAR, having equal angles. A figure is said to be E. all whose angles are equal to one number, as a square, or any regular polygon. All triangles and other figures are said to be E. one with another whose corresponding angles are equal.

EQUIDÆ, or **SOLIDUNGULA** (Lat. solid-hoofed), a family of mammalia of the order *pachydermata*, containing only a small number of species, which so nearly resemble each other that almost all naturalists agree in referring them to one genus, *equus*. They are distinguished from all other quadrupeds by the complete consolidation of the bones of the toes, or the extraordinary development of one toe alone in each foot, with only one set of phalangeal and of metacarpal or metatarsal bones, and the extremity covered by a single undivided hoof. There are, however, two small protuberances (*splint bones*) on each side of the metacarpal or metatarsal bone (*canon* or *cannon bone*), which represent other toes. The E. have six incisors in each jaw, and six molars on each side in each jaw; the males have also two small canine teeth in the upper jaw, sometimes in both jaws, which are almost always wanting in the females. The molars of the E. have square crowns, and are marked by laminae of enamel with ridges forming four crescents. There is a wide space between the canine teeth and the molars. The stomach of the E. is simple, but the intestines are long, and the cæcum extremely large; the digestive organs being thus very different from those of the ruminants, but exhibiting an equally perfect adaptation to the same kind of not easily assimilated food. Another distinctive peculiarity of the E. is, that the females have two teats situated on the pubes, between the thighs. But notwithstanding these characters, so dissimilar to those of the ruminants, they approach them very much in their general conformation, and may be regarded as a connecting link between pachyderms and ruminants. The largely developed and flexible upper lip is a character which belongs to the former rather than to the latter order.

The E. are now found in a truly wild state only in Asia and Africa. Fossil remains exist in the newer geological formations in great abundance in many parts of the old world; very sparingly, however, in the new, although the bones of a peculiar and distinct species (*equus curvidens*), belonging to the pleiocene period, have been found in South America.

The horse and the ass are by far the most important species of this family. The dziggethai has also been domesticated and made useful to man. Of the other species, the zebra, quagga, and dauw, it is generally believed that they are incapable of useful domestication.

EQUILATERAL, having equal sides. A square is equilateral. The equilateral hyperbola is that whose axes and conjugate diameters are equal.

EQUILIBRIUM, the state of rest or balance of a body or system, solid or fluid, acted upon by various forces. See **STATICS** and **HYDROSTATICS**.

EQUINIA, or **GLANDERS**. In another part of this work, glanders has been considered simply as a disease peculiar to animals, and especially the horse. We shall here consider it as a disease affecting man, to whom it is transmissible from animals.

In the great majority of cases, the disease is transmitted from the horse, the ass, or the mule to man; but several instances have been recorded in which it has been transmitted from one human being to another. The disease is no doubt generally due to inoculation, but the virus is also probably capable of being absorbed by unbroken mucous membrane. Most of the recorded cases have occurred in men of good constitution and in the prime of life. The four varieties of this disease which occur in the horse have also been observed in man—viz., (1) acute glanders, (2) chronic glanders, (3) acute farcy, and (4) chronic farcy.

Acute glanders is the commonest form. The period of inoculation ranges, in the majority of cases, from three days to a week. If there is a distinct wound or abrasion through which the poison has been absorbed, the parts around the broken surface become red, tense, and painful, often before the appearance of any of the constitutional symptoms, such as a general feeling of illness, great depression of the spirits, headache, rigors, increased rapidity of the pulse, and pain in the joints. A characteristic pustular eruption, often accompanied by bullæ or blebs, appears on the face and limbs; and

abscesses frequently occur on the face and about the principal joints. A yellow, purulent, fetid discharge, often mixed with blood, exudes from the nasal mucous membrane, which is invariably the seat of a pustular eruption, or of ulcerations. The prostration which is observable from the beginning increases during the course of the disease. The pulse becomes weak and frequent, the breathing difficult, the voice feeble, and the bowels very relaxed, the stools being extremely fetid. Delirium now sets in, which is followed by coma and death. Death usually occurs about the end of the second week, but the duration of the disease has been known to vary from three to fifty-nine days.—*Chronic glanders* is so rare an affection in man that it hardly requires notice. The course of the disease usually extends over several months; and only one case of recovery is reported.—*Acute farcy* seems only to differ essentially from acute glanders in the fact of there being no affection in the mucous membrane of the nostrils.

Little need be said regarding treatment, since no remedies have been found to exercise any influence in checking the course of acute glanders. Arsenic, combined with strychnia, has been found useful in chronic glanders in the horse, and is recommended by some practitioners as worthy of trial in man; and some relief might probably be afforded by the application of weak injections of carbolic acid into the nostrils.

EQUINOCTIAL is the same with the celestial equator. See **EQUATOR**, **CELESTIAL**. The **E.** points are those in which the **E.** and the ecliptic intersect. See **ECLIPTIC**. **E.** time is time reckoned from the moment when the point of Aries passes the vernal equinox. See **EQUINOXES**. This instant is selected as a convenient central point of a uniform reckoning of time for the purposes of astronomical observers.

EQUINOCTIAL STORMS, the winds which are believed to be prevalent at the time when the sun, in consequence of his proper motion, passes through the equinoctial points. The belief in the occurrence of such storms is widely spread, not only in this country, but also in Great Britain. The popular belief, however, seems to be unsupported by the records of carefully conducted observations. On the contrary, at Gordon Castle, in Strathspey, Scotland, observations conducted for nearly fifty years show fewer storms on the five days from the twenty-first to the twenty-fifth of March and September than on the five days preceding and the five days following these dates. Long-continued observations at other places in Great Britain are equally decisive against the popular belief. The whole question has been carefully investigated by Prof. R. H. Scott, of London. He collected all the data of severe storms that passed over Great Britain during a period of fourteen years, and found that out of forty-five storms occurring in March, not one occurred on the twenty-first, and of eighteen storms in September, only one occurred on the twenty-first. Taking intervals of three days and five days, he found :

| MONTHS. | THREE DAYS. | | | FIVE DAYS. | | |
|----------------|-------------|-------|-------|------------|-------|-------|
| | 17-19 | 20-22 | 23-25 | 14-18 | 19-23 | 24-28 |
| March..... | 5 | 3 | 2 | 8 | 5 | 4 |
| September..... | 1 | 2 | 2 | 3 | 2 | 6 |
| Total | 6 | 5 | 4 | 11 | 7 | 10 |

These figures show very plainly, especially in the five-day intervals, that storms are much more frequent just before and after the equinoxes than at the equinoxes themselves. This whole discussion will be found in the *Quarterly Journal of the Royal Meteorological Society of England* (1884).

With a view to determining the facts in regard to this subject, the Signal Office of the United States conducted very extensive investigations, working up all the observations of wind, pressure, rainfall, and storms recorded at nine different stations during the years 1873-88. In a report published in Nov., 1889, the result of these investigations is summed up thus: "The conclusion is inevitable, that the observations do not show a preponderance of storm action during the equinoxes." See *Monthly Weather Review* for Nov., 1889.

EQUINOXES. Sometimes the equinoctial points (see **EQUINOCTIAL**) are called the equinoxes. More commonly, by the equinoxes are meant the times when the sun enters those points, viz., 21st Mar. and 22d Sept., the former being called the vernal or spring equinox, and the latter the autumnal. When in the **E.**, the sun, through the earth's rotation on its axis, seems to describe the circle of the equator in the heavens, and the days and nights are of equal length all over the world. At the vernal equinox, the sun is passing from s. to n., and in the northern hemisphere the days are lengthening; at the autumnal, he is passing from n. to s., and the days are shortening. As the earth moves more rapidly when near the sun, or in winter, the sun's apparent motion is not uniform, and it happens that he takes eight days more to pass from the vernal to the autumnal equinox, than from the latter to the former. The equinoctial points are not stationary. See **ECLIPTIC**.

EQUIPMENT—EQUIPAGE, in military matters, are names given to certain of the necessities for officers and soldiers. During the Crimean war, many officers applied for and obtained money as compensation for the loss or injury of their E., comprising horses, horse appointments, baggage, saddlery, and accouterments. Equipments issued to private soldiers are expected to last a certain number of years, and small deductions from their pay are made in the event of the articles not lasting the proper time.

EQUIPMENT AND RECRUITING, BUREAU OF, a department in the U. S. navy, having charge of supplying vessels with rigging, sail, anchors, and all stock necessary for a voyage; also, the managing of the enlistment of seamen and boys, and of the recruiting service generally.

EQUIPOLLENT (Latin), equal in power or force, equivalent. In logic, propositions of like value in substance, though differing in expression. Example, "Immortality is the continued existence of the human soul in a future and invisible state." "The 'vital spark of heavenly flame' which exists beyond the limits of the grave is immortal."

EQUISETUM, a genus of cryptogamous plants, the structure and affinities of which are not yet well understood, but which many botanists regard as constituting a sub-order of ferns, whilst others prefer to make it a distinct order, *equisetaceæ*. The English name **HORSE-TAIL** is often given to all the species. They have a leafless, cylindrical, hollow, and jointed stem, each joint terminating in a membranous and toothed sheath, which incloses the base of the one above it. The fructification is at the summit of the stem in spikes, which somewhat resembles trobiles (cones), and are formed of scales bearing spore-cases on their lower surface. The spores are minute, oval, or round, green, and each accompanied with four elastic and hygrometrical threads. These threads are sometimes called *elaters*, but it is by no means certain that they are of the same nature with the spiral filaments so called, which are mixed with the spores of many *hepaticæ* (q.v.). Each thread terminates in a kind of club. The stems generally have lateral branches, angular, but otherwise similar in structure to the stem, growing in whorls from the joints; sometimes the stem is simple; or fertile stems are simple, and sterile stems are branched. The species of this genus contain a peculiar acid, called *equisetie acid*. Astringent and diuretic properties exist in these plants, and they were formerly used in medicine, but are not now regarded as of much value. It has been said that they are very injurious to cattle which eat them, but this seems to require confirmation. They abound chiefly in damp soils, and sometimes so much that the plow and harrow, or the grubber, must be employed to extirpate them. Some of them, however, grow in dry fields and gardens; whilst others are found chiefly in ditches or the banks of rivers. They exist in almost all parts of the world, and are seldom of large size, varying from a few inches to a few feet in height, but a comparatively gigantic species has recently been discovered in tropical America. The rough siliceous stems of some species are used for smoothing and polishing wood, particularly those of *E. hyemale*, which are imported into Britain in considerable quantities from Holland, under the name of **DUTCH RUSHES**. The stems of this species are unbranched, or a little branched only at the base. It is one of the most common species in the United States, although not indigenous, and is used for scouring, as in Europe. Other common species introduced from Europe are the scouring rush or shave grass (*E. arvense*), which is widely distributed; *E. sylvaticum* and *E. volutum*, with stems from three to six feet high, occur along river banks from Ohio to Illinois and southward. See *illus.*, **LYCOPODIACEÆ**, vol. IX.; **MUSCHELKALK PERIOD**, vol. X.

EQUITABLE DEFENSES. Under the old practice, by which the limits of common law and equity jurisdiction were strictly defined, equitable defenses were those which, though not competent in a court of common law, might be urged and recognized in a court of equity. As early as 1854 in England it was enacted that such defenses might in many cases be plead in a court of common law, and such pleading did not debar the defendant from afterwards applying for relief to a court of equity. The same permission is given by the codes and procedure acts in most of the American states. It may be stated that with very few exceptions what were formerly equitable defenses may now be put forward both in the United States and in England in the same action and simultaneously with what were formerly considered strictly legal defenses.

EQUITABLE ESTATES, originally estates in real property of such a character that courts of equity only would recognize their existence and effect. But under the fusion of law and equity practice since 1875 in England, and under the general code practice in the United States, as well as under the provisions of special statutes of other states, equitable estates are now recognized by courts not distinctly courts of equity. The most important classes of these estates are, equities of redemption, constructive trusts, the right of the *cestui que* trust in a trust estate, and equitable charges generally. Even under the old rigid distinction between law and equity a court of law might in some cases recognize the existence of an equitable estate; thus, a trustee guilty of breach of trust toward those possessing an equitable estate in the property might be criminally prosecuted in a court of law.

EQUITABLE MORTGAGE, either the mortgage of an equitable as distinguished from a legal interest in an estate (see **EQUITABLE ESTATES**) or a lien upon real estate not so

formally constituted as to be regarded by the common law as a mortgage, but recognized in equity as having practically the force of a mortgage. An example of the latter use of the phrase is to denote the lien existing where a debtor deposits his title deeds with a creditor. An American writer of authority mentions the following cases as coming properly under the designation of equitable mortgage: where the subject of the mortgage is trust property; where it is an equity of redemption; where there is merely a written agreement to make a mortgage; and the case of deposit of title deeds by a debtor, as above.

EQUITES. See EQUESTRIAN ORDER.

EQUITY, COURTS OF. The existence side by side of two completely distinct sets of courts, one administering common law and the other equity principles, was for centuries an anomaly in jurisprudence. In our times this anomaly has been in great measure done away with, both in the United States and in England; in the former country by procedure and code acts, in the latter by the effect of the statutes of 1875, which created one superior court having both common-law and equity jurisdiction in its four great divisions. In the United States many of the states have, from the beginning of their individual history, given to the same courts equity and law jurisdiction; others have, at a later period in their history, adopted what is known as the code practice, in which a single and simple form of procedure is followed and the old distinctions between law and equity are ignored. As an example, we may take the state of New York. Here separate equity courts long existed and the title of chancellor was retained up to 1814. The court of chancery, however, was cumbersome in its rules, uncertain in its principles, and generally disadvantageous. At that date Chancellor Kent began to unify and simplify its practice, and on the retirement, nine years later, of this great jurist the bar of New York in an address to him compared him to Lord Nottingham, of whom Blackstone said that "he was able in nine years to build up a system of jurisprudence and jurisdiction upon wise and national foundations," thus being really the founder of the equity system of England. But in 1848 New York abandoned the cumbersome double system of courts of equity and law and her practice is now single and simple, any court having power to apply the principles of equity as well as of the common law and statute law. The constitution of the United States especially confers equity powers upon United States courts. In a few states—chiefly or altogether in the south—the old distinction is still maintained. Of the principles of equity proper we speak in the following article. The history of the way in which separate courts of equity took their rise will be found sketched under the title **CHANCELLOR**. The remedies applied by courts of equity—whether separate or co-ordinate with common-law courts—are either designed to prevent wrong-doing, such as injunctions (which may be either prohibitory or mandatory), or to give relief for an injury already inflicted. Among the more important subjects to which courts will apply the latter class of remedies are: the relief from fraud or oppression in contracts; the compelling specific performance of contracts; the setting aside of contracts which are against public policy; the construing of contracts with a view to justice when the common-law rules would do injustice; the protecting of the equitable rights of a mortgagee; the appointing of receivers; the compelling disclosure of facts; the adjustment of partnership accounts; the relieving from the results of mistake or accident where common law would not intervene. All these and similar remedies, which were formerly ignored by courts of common law and could be obtained only by applying to a court of equity, can now be petitioned for and obtained in most of the states in this country and in England by petitioning to any court of original jurisdiction. Consequently, the old distinction which was made between the powers of courts of equity as being exclusive, concurrent or assistant, has now little importance.

Law and equity are generally now administered concurrently, and where the principles of the two great branches of jurisprudence differ, those of equity prevail. Certain classes of cases which were formerly the exclusive care of courts of equity (for instance, those relating to the rights of minors, as to person and property, to guardianship, trusts, etc.) have been handed over to the exclusive jurisdiction, in England, of the chancery division of the high court of justice; in the United States, in part to probate or—as they are called in some states—ordinary courts.

EQUITY, PRINCIPLES OF. In its use to denote a branch of jurisprudence, the word equity has a much narrower meaning than in its common use to signify simply natural justice. Equity came into existence to supplement the common law, not to supplant it. Its principles, at first, perhaps, indefinite and dependent in no small measure on the sense of justice of the chancellor or judge of an equity court, in time came to be recognized and determinate, limited in application and dependent on precedent in much the same way as were common-law principles. At first, indeed, the looseness in jurisdiction and in scope of principles was a cause of complaint among lawyers, so that one of them declared that "equity was only the length of the chancellor's foot." We may take as an illustration of the need of something to supplement common-law methods the common and important case of obtaining an injunction to prevent a wrong-doing. It was a maxim of the common law, "*ubi jus, ibi injuria*"—that is, wherever a legal right existed an injury thereto might be the subject of legal remedy; but this principle in nowise pro-

vided a remedy for a threatened injury. The obvious wrong in compelling a man to remain quiet when his property or personal interest were on the point of being attacked, to wait until the injury were completed, and then to be satisfied with money damages, suggested the important and practical remedy of calling upon a court to issue an order forbidding the carrying out of the wrongful purpose. This was quite contrary to common-law ideas, but was one of the first principles recognized by equity, and still continues to be one of the most important remedies granted by it.

We have said that equity had a narrower significance than natural justice ; it does not, accordingly, attempt to intervene to enforce justice in every conceivable case ; many matters must of necessity be left to the individual conscience and moral sense ; generally speaking, the principles of equity do not attempt to enforce "such moral duties as charity, gratitude, or kindness, or even positive engagements, which are not founded on a good or valuable consideration." This principle is well expressed by a decision in one of our state courts of appeal, which says that "Equity is not the chancellor's sense of moral right or his sense of what is equal and just, but is a complex system of established law ; and an equitable maxim—as, 'Equality is equity'—can only be applied according to established rules." In short, as is often said, equity is a portion of law accidentally severed from the common law. Although, as shown in the preceding article, the principles of equity and of common law are now almost universally, both in the United States and in England, administered by the same courts, yet it is often important to distinguish between them. The province of equity was rather to protect existing rights by keeping them intact, or by preventing foreseen injury to them, than to punish infraction of such rights or award damages after the wrongdoing. Its principles were accordingly applied more particularly to the granting of injunctions, the discovery of fraud, the correction of mistakes and accidents, the enforcing specific performance of contracts, the carrying out of trusts, the perpetuation of evidence, and similar matters. The principles of equity are illustrated and summarized in many maxims or formulae, such as : "Equity follows the law"—that is, a recognized rule of law will not be set aside by equity, but the effort will be to interpret or apply such a rule in a spirit of equity or natural justice ; "Equity looks to the substance and not to the form"—that is, in some cases (for instance, in mortgages of real estate) courts of equity will see that in the instrument which does not appear on its face—treating the mortgage, for instance, not as an absolute conveyance, but as a method of giving security for a loan, and protecting the right of the mortgagee after the debt is paid, or, as it is called, his equity of redemption ; "He who seeks equity must do equity"—that is, a person invoking principles of equity to his assistance must recognize those principles in his dealings with the other parties to the transaction ; "Equity assumes that to be done which ought to be done"—that is, a man may not, when demanding that principles of equity be applied to a transaction, at the same time rely on a mere technicality to establish his own right (following this principle equity will often, for example, treat an agreement to sell real estate as if a formal deed had been executed) ; "Where law and equity conflict equity prevails"—that is, a court of equity may sometimes overrule a court of law and even compel it to do what, under its own principles, it had refused ; and "Where there are equal equities, the law must prevail."

EQUITY OF REDEMPTION, the privilege retained by a mortgagee of real property to redeem the estate, although the original conditions of the mortgage bond have not been complied with. Under the wording of a mortgage it might be supposed that the mortgagee had absolute right of possession on the failure of the debtor to pay on the day named. Courts of equity, however, have regarded the property as being essentially a security, and have protected the rights of the mortgagee by giving him a reasonable time to redeem the property. This time, as well as the privilege itself, is often called the equity of redemption ; it varies in the states of this country from six months to several years. In common parlance the term is often used to denote the residue of value in a mortgaged piece of real estate which belongs to the mortgagee after deducting the amount of mortgage and interest due.

EQUIVALENTS, in chemistry. See **ATOMIC WEIGHTS**.

ERA. See **CHRONOLOGY**.

ÉRARD, SÉBASTIEN, 1752-1831; born in Strasburg ; distinguished for improvements upon the piano and the harp. He went to Paris, where the duchess of Villeroi became his patron, and in her house he made his first piano, which was one of the earliest manufactured in France. He became suddenly famous, and established a large manufactory in Paris, and during the revolution in London. Thenceforward devoting his life to the development and improvement of his favorite instrument, he brought it to a perfection before unknown.

ERA'SED AND **ERADICATED**, heraldically signifies that an object is plucked or torn off, and showing a ragged edge; as opposed to *coupé* or *coupy*, cut, which shows a smooth edge. A tree plucked up by the roots is said to be eradicated.

ERASIS TRATUS, one of the most famous physicians and anatomists of ancient times, flourished in the 3d c. B. C., and is supposed to have been born at Inlis, in the island of Ceos. He resided for some time at the court of Seleucus Nicator, king of Syria, and

while there acquired great renown by discovering and curing the disease of the king's eldest son, who was pining for the love of the young and beautiful Stratonice, whom his father in his old age had married. Afterwards E. lived for some time at Alexandria, where, giving up practice, he devoted himself with great energy and success to his anatomical studies. The date of his death, which seems to have taken place in Asia Minor, is not known. He founded a school of medicine, wrote several works on anatomy—in which branch he was most celebrated—on practical medicine, and pharmacy. He believed that the heart was the origin both of the veins and arteries, and, had it not been his conviction that the arteries contained *air* instead of *blood*, little doubt is entertained but that he would have anticipated Harvey in the discovery of the circulation of the blood. Of his numerous writings only some obscure fragments and titles have been preserved. Compare Hieronymus, *Erasistrati et Erasistrateorum Historia* (Jena, 1790).

ERASMUS, DESIDERIUS, one of the most vigorous promoters of the reformation, was b. at Rotterdam, 28th Oct., 1467. He was the illegitimate son of a Dutchman named Gheraerd, or Garrit, by the daughter of a physician. In accordance with the fashion among scholars of his time, he changed the name Gheraerd into its Latin and Greek equivalents Desiderius Erasmus (more correctly Erasmus)—meaning desired, loved. Till his 9th year, E. was a chorister in the cathedral at Utrecht. He was then sent to school at Deventer, where his talents began to display themselves in so brilliant a manner, that it was even then predicted that he would one day be the most learned man of his time. After the death of his parents, whom he lost at the age of 14, his guardians determined on bringing him up to a religious life, and—with the intention, it is said, of sharing his small patrimony among themselves—in his 17th year, placed him in the Augustinian convent of Stein. From this constrained manner of life, however, he was released by the bishop of Cambray. After having taken priest's orders he went to Paris (in 1496), to perfect himself in theology and the humane sciences. Here he supported himself in a somewhat precarious manner, by giving private lectures, and in 1497 accompanied some Englishmen, who had been his pupils, to England, where he was well received by the king. He, however, soon returned to Paris, and in 1506, to enrich his knowledge, visited Italy. At Turin he took the degree of D.D. Shortly after, he applied to the pope for a dispensation from his monastic vows, granted in 1516. During the course of his journey he visited Venice, Parma, Rome, and other interesting cities, in company with his pupil, Alexander Stuart, a natural son of James IV. of Scotland, who, along with his father, was afterwards slain at the battle of Flodden. At Rome, the most brilliant prospects were held out to him. Cardinal Grimani, a famous lover of learning in that day, offered, out of his admiration for E., to make him "partaker of his house and fortunes." Other eminent men vied with Grimani in showing respect to the young scholar, among whom may be mentioned John de' Medici, afterwards Leo X., cardinal Raphael of St. George, and Giles of Viterbo, gen. of the Augustines. The pope (Julius II.) also offered him a place among his penitentiaries, an office of considerable consequence, and, it would appear, a "step to the highest preferments in that court." E., who had always an eye to the main chance, regretted, at a later period of his life, that he had not accepted the offers held out to him in Rome, but meanwhile, having pledged himself to return to England, where also he had many friends, he set out for that country in 1509, after the accession of Henry VIII. In several of the cities through which he passed he met with friends and patrons, who wished him to settle amongst them, but as Henry was a correspondent of his, E. was induced to cherish the highest hopes of personal favor from that monarch, and could not be prevailed on to stay for more than a very brief period. He had no sooner, however, arrived in England than he found out his mistake. At first, he lodged with sir Thomas More, and during his stay with him composed his *Encomium Morie*, or Praise of Folly, the purpose of which is to expose all kinds of fools, but especially those who flourished in the church, not sparing the pope himself. For a short time he filled the office of professor of Greek at Oxford, but on the whole was very scantily supplied with the means of subsistence. In 1514, he returned disappointed to the continent, and resided chiefly at Basel, where he died, 12th July, 1536. E.'s extensive and profound learning was equalled by his refined taste and brilliant wit. A natural love of independence and quiet made him prefer a life of learned leisure and retirement to one of greater publicity, nevertheless, the readiness with which he assumed the character of an adroit man of the world, brought upon him the hostility of many of the nobler spirits of his time. He was no hero, and he knew it. He frankly confesses that "he had no inclination to die for the sake of the truth." Luther, in whom the soul and courage of the apostle Paul seemed to be revived, overwhelmed him with reproaches for his cowardice in regard to the reformation. But we must not forget that E. by his mental constitution was averse to enthusiasm. He was a scholar and a critic, not a preacher or iconoclast, and he was at least honest enough to abstain from denouncing the opinions of Luther, though he disapproved strongly of his violent language. Besides, there was a tincture of rationalism in the great Dutchman, which probably helped to chill his love of mere *Lutheranism*. But his services in the cause of science were great and lasting, and his writings are still esteemed for the importance of the subjects treated of, and their classical style. Besides editing several of the ancient authors, and various philological and theological writings, he prepared the earliest edition of the Greek Testament, which

appeared at Basel in 1516. This is reckoned by some his greatest work. Michaelis says that perhaps there never existed an abler editor of the New Testament, and that E. possessed in the highest degree natural abilities, profound learning, a readiness in detecting errors, with every qualification that is requisite to produce critical sagacity. His best known work, however, is his *Colloquia*, a masterpiece. Of all his writings, this has exercised the greatest influence. The first edition appeared in 1522, but did not please E., who issued a second during the same year. A third appeared in 1524. This book, which was meant, according to Erasmus, only to make youths better Latinists and better men, was condemned by the Sorbonne, prohibited in France, and burned in Spain. No one who takes up the book will wonder at its condemnation. It contains the most virulent and satirical onslaughts on monks, cloister-life, festivals, pilgrimages, etc., but it is disfigured by lewd and unchaste passages, which are wholly inexcusable. The work has been translated into almost all the modern languages. His *Encomium Morie*, or Praise of Folly, has been already mentioned. It was published in the original, with a German translation, and illustrations by Holbein, by W. G. Becker (Basel, 1780). E. himself superintended an edition of his works, published by Frobenius in Basel. The most complete edition is that of Leclerc (10 vols., Leyden, 1603-6). The life of E. has been written in French by Burigny (2 vols., Paris, 1758), in German by Müller (Hamburg, 1823), and in English by Knight (Cambridge, 1726), Drummond (2 vols., 1873), and Froude (1894).

ERASTIANS (see ERASTUS, THOMAS) were adherents of the doctrines laid down by Erastus in his book on *Excommunication*, namely, that though the spiritual part of religion is entirely a matter of individual opinion and inclination, its external organization, such as the nomination and commission of ministers, the punishment of moral offenses, etc., is entirely a matter of civil government; and that, consequently, the church can have no right under any circumstances to communicate or withhold its privileges from any of its members. There never was an actual sect of E. in Great Britain, but these views were speedily adopted by various eminent Englishmen and were upheld in the Westminster assembly, 1643-49, by the eloquence of the lawyers Selden, St. John, and Whitelocke, and the divines Lightfoot and Coleman. But, after a long controversy, the proposition that "the Lord Jesus, as king and head of His church hath, therein appointed a government in the hand of church officers, distinct from the civil magistrate" was finally carried, against the single dissentient vote of Lightfoot. Though the *Chapter of Church Censure* in which it occurs was never formally ratified by Parliament, Erastianism failed from that time to take any deep root. During the conflict in the church of Scotland, which resulted in the secession of the Free church, the term Erastian was constantly applied to all who held that the church had no power to nullify by law the operation of lay patronage; but it was indignantly rejected by them. It is now often used, but with little knowledge of its real meaning, by the extreme Presbyterians as a term of reproach against the more moderate party.

ERASTUS, THOMAS, a learned physician and theologian, was b. at Baden in Switzerland, 7th Sept., 1524. His real name was *Lieber*, which, according to the fashion of his times, he translated into Greek. In 1540, he went to the university of Basel, where he studied divinity, philosophy, and literature. He subsequently visited Italy, where he betook himself to medicine, and obtained the degree of M.D. from the university of Bologna. After an absence of nine years, he returned to his own country, and lived for some time at the court of the princes of Henneberg, where he acquired a great reputation as a medical practitioner. The elector palatine, Frederick III., now invited him to his court, and appointed him first physician and counselor of state. He also conferred on him the chair of physic in the university of Heidelberg. In 1581, he was selected to fill a similar office at Basel, where he died, Dec. 31, 1583, after establishing a liberal foundation for the provision and education of poor students in medicine, which was long called the *Erastian foundation*. Among E.'s medical works may be mentioned his *Disputationum de Medicina Nova Philippi Paracelsi* (Basel, 1572-73); *Theses de Contagio* (Heidelberg, 1574); and *De Occult. Pharmaco. Potestativibus* (Heidelberg, 1574). As a physician, E. is creditably characterized by his distrust of abstract and *a priori* theorizing, and his conviction that experimental investigation is the only road to knowledge. But his fame now rests chiefly on what he wrote in ecclesiastical controversy. In his book *De Cæna Domini*, he contended for the figurative interpretation of the passage, "This is my body," etc., and supported this view at the conference held at Maulbronn between the divines of the palatinate and those of Wittenberg. But his great work is his *Eeplatio Questionis Gravissimæ de Excommunicatione*. Although this work was not published till some years after his death, E. had published the same opinions as it contains in the form of theses, directed against Gaspar Olevianus, a refugee from Treves, and various other persons, who were anxious to confer on ecclesiastical tribunals the power of punishing vices and misdemeanors. E. denied the right of the church to excommunicate, exclude, absolve, censure—in short, to exercise discipline. Denying "the power of the keys," he compared a pastor to a professor of any science, who can merely instruct his students; he held that the ordinances of the gospel should be open and free to all, and that penalties being both in their nature and effect *civil* and not *spiritual*, ought to be inflicted only by the civil magistrate.

E'RATH, a co. in central Texas, drained by Bosque river; 1042 sq.m.; pop. '90, 21,594, incl. colored. The surface is rolling and tolerably fertile, but best adapted to pasturage. Co. seat, Stephenville.

ERATO, one of the nine muses, daughters of Jupiter and Mnemosyne. She presided over amatory and nuptial poetry. See illus., MYTHOLOGY, vol. X.

ERATOS THENES, an eminent Greek writer, called, on account of his varied erudition, the *philologist*, was b. at Cyrene 273 B.C. Among his teachers were Lysanias the grammarian, and Callimachus the poet. By Ptolemy Euergetes, he was called to Alexandria to superintend his great library. Here he died of voluntary starvation, at the age of 80, having become blind, and wearied of life. As an astronomer, E. holds an eminent rank among ancient astronomers. He measured the obliquity of the ecliptic, and the result at which he arrived—viz., that it was $23^{\circ} 51' 20''$ —must be reckoned a very fair observation, considering the age in which he lived. Hipparchus used it, and so did the celebrated astronomer Ptolemy. An astronomical work which goes under the name of E., but which is certainly not his, is still extant, and is called *Katasterismoi*; it contains an account of the constellations, their fabulous history, and the stars in them. It is believed, however, that E. did draw up a catalogue of the fixed stars, amounting to 675; but it is lost. A letter to Ptolemy, king of Egypt, on the duplication of the cube, is the only complete writing of his that we possess. E.'s greatest claim to distinction, however, is as a geometer. In his attempt to measure the magnitude of the earth, he introduced the method which is used at the present day, and found the circumference of the earth to be 252,000 stadia; which, according to Pliny, is 31,500 Roman miles. But as it is not known *what* stadium E. used, it is possible that he came nearer the actual circumference than the above figures indicate. His work on geography must have been of great value in his times: it was the first truly scientific treatise on the subject. E. worked up into an organic whole the scattered information regarding places and countries related in the books of travels, etc., contained in the Alexandrian library. He also wrote on moral philosophy, history, grammar, etc. His work on the Old Attic Comedy appears, from the remains we possess, to have been a learned and very judicious performance. Such fragments of E.'s writings as are still extant have been collected by Bernhardt in his *Eratosthenica* (Berlin, 1822).

ERBIUM (symbol E) is a rare metal, the compounds of which are found in a few scarce minerals, especially in *gadolinite*, obtained from Ytterby, in Sweden. In its compounds and properties it resembles the metal aluminium.

ERCILLA Y ZUÑIGA, ALONSO, a Spanish poet, was b. at Madrid, Aug. 7, 1533. He was the third son of a Spanish jurist, and at an early period became page to the infanta Don Philip, son of Charles V., accompanying him on his journey through the Netherlands, and some parts of Germany and Italy, and, in 1554, to England, on the occasion of the celebration of Philip's nuptials with queen Mary. Shortly after, E. went with the army dispatched to America to quell the insurrection of the Auracians on the coast of Chili. The difficulties with which the Spaniards had to contend, the heroism displayed by the natives in the unequal contest, and the multitude of gallant achievements by which this war was distinguished, suggested to E. the idea of making it the subject of an epic poem. He began his poem on the spot, about the year 1558, occasionally committing his verses, in the absence of paper, to pieces of leather. An unfounded suspicion of his having plotted an insurrection involved him in a painful trial, and he had actually ascended the scaffold before his innocence was proved. Deeply wounded, the brave soldier and poet turned to Spain, but Philip treating him with coldness and neglect, E. made a tour through France, Italy, Germany, Bohemia, and Hungary. For some time he held the office of chamberlain to the emperor Rudolf II., but in 1580 returned to Madrid, where he in vain exerted himself to realize an independence. The latter years of his life were spent in obscurity and poverty at Madrid, where he died, 1594. His historic epos, written in the octosyllabic measure, and entitled *Araucana*, is, with the exception of a few episodes, a faithful description of actual events. Cervantes, in his *Don Quixote*, compares it with the best Italian epics, and it has undoubtedly not a little of the epic style and spirit. The first part is the freshest in character, having been completed before the author's return to Europe, where it was first published separately (Madrid, 1569). The second part appeared nine years later. In it E., by the introduction of episodes, yielded more to the taste of the time; and this was still more the case in the third part, which was first published, along with the two others, in 1590. In Spain, and likewise in other countries, many reprints of the poem appeared (the most elegant, 2 vols., Madrid, 1776; the most accurate, 2 vols., Madrid, 1828). A continuation was published by Don Diego Santistevan Osario, of Leon (Salamanca, 1597). A German translation has been published by Winterling (2 vols., Nuremberg, 1831).

ERCKMANN-CHATRIAN (EMILE ERCKMANN and ALEXANDRE CHATRIAN), two French men of letters, the first of whom was born 20th May, 1822, at Phalsbourg; the second, 18th Dec., 1826, in the village of Soldatenthal, commune of Abreschwiler, both in what was then the French dep. of Meurthe, but is now reunited to Germany as part of the imperial territory of Alsace-Lorraine. Erckmann, the son of a bookseller,

went through a rather irregular course of study at the college of his native town, went to Paris in 1842 to study law, which he broke off several times, and only passed his third examination in 1857, and finally abandoned the study in the following year. During the interval, he had set himself to make a name in literature, in co-operation with M. Chatrian. The latter, belonging to an old family of glass-makers in Meurthe, ruined by reverses in trade, was acting as tutor at the college of Phalsbourg, when, in 1847, he was introduced to M. Erckmann. From that time the two friends employed their pens in the same works, which they signed with the two names united in one; and it was only about 1863 that the authors informed their readers that the numerous works of fiction, which had obtained a wide-spread popularity, and were supposed by the general public to be the work of a single writer, were the fruits of their friendly collaboration. Their early works attracted comparatively little notice; and it is said that their first work was rejected by all the newspapers of Paris, and by many provincial journals. In 1848, they published several feuilletons in the *Démocrate du Rhin*, which had just been started: *Le Sacrifice d'Abraham*, *Le Bourgmestre en Bouteille*, etc., which they have since published separately. At the same time they wrote a drama, *Le Chasseur des Ruines*, for the Ambigu-Comique, which the theater accepted, subject to changes, which they refused to make. They produced another drama, *L'Alsace* in 1814, for the theater of Strasburg, which was suppressed by the prefect on the second representation. They wrote numerous novels at this time for different journals, some of which were very little noticed, while others remained in MS. for years. Despairing of being able to live by their pens, Erckmann recommenced his law studies, and Chatrian obtained a situation in the office of the Eastern railway. It was not till 1859 that *L'Illustre Docteur Mathéus* (1859, in-18; 3d edition, 1864), published by the Librairie-Nouvelle, gave a certain éclat to the collective name of Erckmann-Chatrian. *Le Fou Yégoïf* (1862, in-18) is one of a series of novels, the subjects of which are taken from their national history, and gives a picture of the invasion of 1814. *Le Conscrit de 1813* (1864) and *Waterloo* (1865) are fragments of an autobiography, and are supposed to be the recollections of a common soldier, and relate the disastrous campaigns of 1813 and 1814. These may be called the gems of their collection. *Le Joueur de Clarinette* (1863), a simple story of a village musician, and *Les Amoureux de Catherine*, another tale of village life in the same volume, are nearly perfect. *L'Homme du Peuple* appeared in 1865, and is less favorably spoken of as a work of art. It pictures the life of the modern French workman. In 1866, appeared *La Maison Forestière*, and *La Guerre*; in 1867, *Le Blocus*, which has been translated under the title, *The Blockade of Phalsbourg*; a historical romance in 1868, *Histoire d'un Paysan*; in 1869, *Le Juif Polonais*, a play. Among their latest works are *The Story of the Plébiscite by one of the 7,500,000 who voted Yes* (trans. in *Cornhill Magazine*, 1871-72); and *Brigadier Frédéric: a Story of an Alsatian Exile*; *Les Rantzeu* (1882). In 1888 the two friends quarreled, but were reconciled in the following year, and in 1890 Chatrian died. Erckmann subsequently published *Kaleb et Khora* and *La Première campagne du grand-père Jacques*. See COLLABORATION.

ERDMANN, JOHANN EDUARD, a German philosopher; b. 1805; studied theology at Dorpat, attended the lectures of Schleiermacher and Hegel, and became a pastor. In 1836, he was appointed professor of philosophy at Halle. He published a number of works, including *Grundriss der Geschichte der Philosophie* (1866, Eng. trans. 1893). He d. in 1892.

ERDMANN, OTTO LINNE, 1804-69; a German chemist, educated at Dresden and the university of Leipsic; professor of chemistry at Leipsic, where he established a model laboratory. He made important discoveries in the qualities of nickel, and of indigo and other dye-stuffs. He founded a journal devoted to chemical science, and published a number of works on the subject.

EREBUS—the name of one of the sons of Chaos—signifies darkness, and is used specially to denote the dark and gloomy cavern beneath the earth, through which the shades pass in going to Hades.

ERECHTHEUS or **ERICHTHONIUS**, and **ERECHTHE'UM**. Erechtheus, an Attic hero, is said to have been the son of Hephaestus and the earth, and to have been reared by Athena. One form of the tradition states that when a child he was placed by Athena in a chest, which was intrusted to Agrauios, Pandrosos, and Herse, the daughters of Cecrops, with the strict charge that it was not to be opened. Agrauios and Herse, however, unable to restrain their curiosity, opened the chest, and discovering a child entwined with serpents, they were seized with madness, and threw themselves down the most precipitous part of the Acropolis. Afterwards Erechtheus was the chief means of establishing the worship of Athena in Attica. He is regarded as the founder of the Erechtheum, the temple of Athena Polias, guardian of the city. This original Erechtheum, which contained Erechtheus's tomb after his death, and which was called by his name, was burned by the Persians, but a new and magnificent temple was raised upon the same site—n. of the Parthenon, and near the northern wall of the Acropolis—in the beginning of the 4th c. B.C. The second Erechtheum was a splendid structure of the Ionic order, of an oblong shape, extending from e. to w., abutting in side chambers at the western end, towards the n. and s., and having porticoes adorned with columns at its eastern, its northern, and southern extremities. It is now a complete ruin. See illus., GREECE, vol. VII.

ERECTION, LORDS OF, those of the nobility in Scotland to whom the king, after the reformation, granted lands, or tithes, which formerly belonged to the church. They were also called titulars of tithes; the gifts being by no means confined to the nobility. These titulars had the same rights to erected benefices, both in lands and tithes, which had formerly belonged to the monasteries and other religious houses. The grants were made under the burden of providing competent stipends to the reformed clergy—an obligation which was very little attended to by the grantees, prior to the decrees arbitral of Charles I., in 1629.

EREGLI, or **EREKLI** (anc. *Heraclea*), a t, and port in Asia Minor, on the Black sea, 128 m. e.n.e. of Constantinople; pop. 2,000. There is a good harbor, some ship-building, and export trade in timber, coal, silk, linen, wax, etc. The coal mines are extensive, and yield much of the supply of Constantinople. E. is the place where the 10,000 Greeks under Xenophon embarked on their return.—Another town of the same name, 55 m. n.w. of Constantinople, has a harbor on the sea of Marmora.

EREMACAUISIS (Gr. *ërema*, gently, and *kausi*, combustion) is a term originally proposed by Liebig to indicate the slow process of combustion at ordinary temperatures, which ensues when organic compounds, such as wood, are left exposed to the air, and gradually rot away or decay. The process consists in the oxygen (O) of the air combining with the hydrogen (H) of the wood forming water (HO), and in less quantity with the carbon (C) forming carbonic acid (CO₂), leaving a brown mold or powder, called by chemists ulmin, or humus, in which carbon preponderates.

ERETRIA, a city in the island of Eubœa, founded before the war of Troy, and anciently the rival of Chalcis in commerce. It was destroyed 490 B.C., by the Persians, but was soon rebuilt, and was active in the Peloponnesian war. It was the seat of the school of philosophy established by Menedemus, a disciple of Plato. The ruins of the city are still visible.

ERFURT, a city of Prussian Saxony, anciently capital of Thuringia, stands in a highly cultivated plain, on the right bank of the Gera, 14 m. w. of Weimar. Till 1873, E. was strongly fortified, and was accounted a fortress of the second rank. Its two citadels, the Petersberg and the Cyriaksburg, were both formerly monasteries. Among the numerous churches, the cathedral and the church of St. Severus are the finest. The cathedral is one of the most venerable Gothic buildings in Germany, and possesses, besides a very rich portal, sculptures dating from the 11th to the 16th century. Of the convents, only that of the Ursuline nuns remains. The monastery of St. Augustine, famous as the residence of Luther, whose cell was destroyed by fire in 1872, was converted in the year 1820 into an asylum for deserted children. The other remarkable buildings are the university, founded in 1378, and suppressed in 1816; the royal academy; the library; numerous educational establishments, infirmaries, etc. Pop. '71, 43,616; '95, 78,167. Horticulture and an extensive trade in seeds are carried on. The principal manufactures are woolen, silk, cotton, and linen goods, yarn, shoes, stockings, tobacco, leather, etc.

E. is said to have been founded in the beginning of the 5th c. by one Erpes, from whom it took its original name of Erpesford. During the middle ages, at the time of its highest prosperity, E. was strongly fortified, and contained 60,000 inhabitants. In 740, St. Boniface founded a bishopric at E., and in the year 805 it was converted into an entrepôt of commerce by Charlemagne. It afterwards belonged to the Hanse-league, then to the elector of Mainz, from 1801-6 to Prussia, and from that time until 1813 it was under French rule. E. was finally restored to Prussia by the congress of Vienna. In the spring of 1850, the parliament of the states, which had combined together for union, held its sittings at Erfurt.

ERGOT, a diseased condition of the germen of grasses, sometimes also observed in some of the *cyperaceæ*. It begins to show itself when the germen is young; different parts of the flower assume a mildewed appearance, and become covered with a white coating composed of a multitude of minute spore-like bodies mixed with delicate cob-web-like filaments; a sweet fluid, at first limpid, afterwards viscid and yellowish, is exuded; the anthers and stigmas become cemented together; the ovule swells till it greatly exceeds the size of the proper seed, bursts its integuments, and becomes elongated and frequently curved, often carries on its apex a cap formed of the agglutinated anthers and stigmas, and assumes a gray, brown, purple, violet, and at length a black color, as the viscid exudation dries and hardens. The structure differs very much from that of the properly developed seed; the qualities are not less different, almost one half of the whole substance consists of *fungin*; and the cells contain, instead of starch, globules of a peculiar fixed oil—**OIL OF ERGOT**, to which the remarkable qualities of E. are supposed to be chiefly or entirely due. Oil of E. forms about 35 per cent of the E. of rye. E. appears to have been first observed in rye, in which it becomes very conspicuous from the large size it attains, sometimes an inch or even an inch and a half in length. It is, however, not uncommon in wheat and barley, although in them it is not so conspicuous, from its general resemblance to the ordinary ripened grain. Rye-grass is often affected with E., as are many other grasses; and it is of frequent occurrence in maize, in which also it attains its greatest size. E. has been supposed to be merely a

disease occasioned by wet seasons or other climatic causes. But it appears now to be fully ascertained that it is a disease occasioned by the presence of the *mycelium* of a fungus; the spores of which may perhaps be carried to the flower through the juices of the plant, for there is reason to think that E. in a field of grain may be produced by infected seed. Mr. Quekett, in 1838, described a fungus, a kind of mould (q.v.), which he found in E., and to which he gave the name of *ergotetia abortifaciens*. Link and Berkeley afterwards referred it to the genus *oidium*; and they, as well as others, believed it to be the true E. fungus. The spores of this E. mold, however, vegetate readily, under proper conditions of warmth and moisture, in situations very different from that in which E. is produced; and its presence is perhaps a consequence rather than the cause of ergot. The true E. fungus seems to have been discovered by Tulasne, who published a description of it in 1853. That of the E. of rye is called *cordiceps* (or *claviceps*) *purpurea*; its mycelium alone exists in E., but if the ergoted grains are sown, the fungus develops itself in its perfect form, growing in little tufts from the surface of the E., with stem about half an inch long, and subglobular head. Allied species appear to produce the E. of other grasses.

E. is inflammable; the fixed oil which it contains, indeed, makes it burn readily if brought into contact with the flame of a candle. It is a valuable medicine, exercising a specific action on the womb, particularly during labor, and by the greater frequency and force of the contractions which it causes when cautiously administered, often most beneficially hastening delivery. Its employment for this purpose is said to have originated—in consequence, probably, of an accidental discovery—with a provincial female practitioner in France. Its introduction into American practice dates only from 1824. It is the E. of rye which is always employed; also called **SPURRED RYE**, or *secale cornutum*. It has been employed also as a sedative of the circulation, to check various kinds of hemorrhage. E. is administered in various forms—powder, decoction, extract, tincture, oil of E., etc.—In large or frequent doses, E. is a poison, sometimes producing convulsions, followed by death; sometimes gangrene of the extremities, resulting in mutilation or in death.

E. of rye consists of 35 per cent of a peculiar fixed oil, $1\frac{1}{4}$ of ergotin, 46 of fungin, the remainder being gum, fat, albumen, salts, etc. E. burns with a yellow-white flame, and treated with water, yields a reddish colored liquid with acid properties. In considerable quantities, it is a poison to the lower animals as well as to man.

ERGOTISM, the constitutional effect of ergot of rye (q.v.). See also **RAPHANIA**.

ERIC is the Scandinavian form of the name Henricus, Enrico, and Henry of southern nations. Many kings of the name reigned separately in Denmark and Sweden, and some ruled over the whole of Scandinavia after the union of Calmar. The memory of the two earliest rulers of the name in Denmark merits our notice from their association with the introduction of Christianity. Eric I., who died in 860, protected the Christians in the latter part of his reign, and, under the direction of the missionary Ansgar or Ansharius, founded the cathedral of Ribe, the first Christian church in the land. In his time, the Northmen began those incursions into more southern countries, which were destined to exercise so permanent an influence on European history. Eric II. followed in the steps of his father, and permitted Ansgar to prosecute the labor of converting and civilizing the people, which won for him the title of the tutelar saint of the north. To Eric II. is ascribed the reorganization of those guilds which finally merged in the municipal corporations of the middle ages, but which were, at first, a mere modification of the heathen brotherhoods of the Scandinavian heroic ages, and constituted associations, whose members were a privileged class, separated by distinct laws, rights, and duties from the rest of the people. Denmark suffered in the 12th c. in an equal degree from the two Erics who ruled over her, for while Eric, surnamed Emun, exhausted the strength of the land by the indomitable pertinacity with which he endeavored, by force of arms, to compel the Vandals and other piratical neighbors to accept the Christianity which he thrust upon them, Eric "the Lamb" crippled the powers and resources of the crown by his pusillanimous subserviency to the clergy. The three Erics (Eric VI., VII., and VIII.) who occupied the throne, with only the intermission of a few years, from 1241 to 1319, are associated with one of the most disastrous periods of Danish history. Long minorities, the suicidal practice of dismembering the crown-lands in favor of younger branches of the royal house, and futile attempts to restrain the ever-increasing encroachments of the church, combined to bring the country to the brink of destruction. Eric VI. (Plogpenning) and Eric VII. (Glipping) were both assassinated, the former at the instigation of a brother, and the latter in revenge for a private injury. Eric VIII., the last of the name before the union of Calmar, died childless, and was succeeded, in 1319, by his ambitious brother Christopher, who saw himself compelled to repay his partisans at the expense of almost all the prerogatives and appanages which still belonged to the crown.

In Sweden, the first of the name who merits our notice is king Eric, surnamed the Saint, who was slain in battle in 1161, after a short reign, which was signalized, in that age of anarchy, by the foundation of many churches and monasteries, and by the promulgation of an excellent code of laws, known as *St. Eric's Lag*. This law contained provisions by which a higher status in society was secured to women, by granting

them a fixed proportion of the heritage of their male relatives, and certain definite privileges within their households. St. Eric waged frequent war with the Finns, and compelled them to adopt the outward forms of Christianity. The two namesakes and descendants of St. Eric, who ruled in Sweden during the 13th c., and Eric XII., who reigned from 1350 to 1359, have little claim to our notice, for internal disturbances and wars with their neighbors brought about the same fatal results as those which are associated with the reigns of the *Eric*s in Denmark during the middle ages. In 1412, on the death of the great Margaret, her relative, Eric of Pomerania, succeeded to the triple crown of Scandinavia, in accordance with the articles of the famous treaty of Calmar. The noble heritage that had been bequeathed to Eric required a firmer hand and a braver spirit than his to keep it in check; and his reckless disregard of treaties and oaths, his neglect of his duties, and his misdirected ambition, led, after years of dissensions, maladministration, and disaffection, to the inevitable result that Eric was declared to have forfeited the respective thrones of the several kingdoms, which proceeded to elect rulers of their own. The intestine wars to which this condition of things gave rise, plunged the whole of Scandinavia into anarchy, and sowed seeds of dissension among the three kindred nations, which bore fatal fruits in subsequent ages. The last ten years of Eric's life were spent in the exercise of piracy in the island of Gothland, whither he had retired with his mistress and a band of followers, and from whence he sent forth piratical expeditions to pillage both friends and foes. Eric married Philippa, daughter of Henry IV. of England, whose memory is still cherished in the north, on account of the many noble deeds with which local tradition associates her name. Eric XIV., the last of the name who reigned in Sweden, had the distinction of being at once one of the worst and one of the most unhappy of the name. He succeeded, in 1560, to the throne of his father, Gustaf Vasa, who was perhaps the greatest and worthiest monarch that ever reigned over Sweden, and immediately on his accession, he made known the difference that was so unfavorably to distinguish his reign from that of his father, by quarrelling with his brothers, thwarting the nobles, and opposing the lower orders. His fickleness and extravagance were displayed in a succession of embassies, which were in turn sent to almost every European court to demand a consort for this vacillating monarch, who usually changed his mind before his envoys had time to fulfill their missions. Elizabeth of England and Mary of Scotland were more than once the objects of his matrimonial schemes; but when the resources of the country had been seriously crippled by these costly and absurd expeditions, Eric married a Swedish peasant-girl, who ultimately acquired an influence over him which was ascribed by the superstitious to witchcraft, since she alone was able to control him in the violent paroxysms of blind fury to which he was subject. It is probable that Eric labored under remittent attacks of insanity, and that to this cause may be attributed the bloodthirsty cruelty with which he persecuted those of his own relatives or attendants who fell under his suspicion. His capricious cruelties at length alienated the minds of his subjects, who, wearied with the continuous wars and disturbances in which his evil passions involved them, threw off their allegiance in 1568, and solemnly elected his brother John to the throne. For nine years, the unhappy Eric suffered every indignity at the hands of the keepers appointed by his brother to guard him, and in 1577, he was compelled to terminate his miserable existence by swallowing poison, in obedience to his brother's orders. Singular to say, this half madman was a person of cultivated understanding, and he solaced his captivity with music and the composition of psalms, and in keeping a voluminous journal.

ERIC THE RED, a native of Norway, b. about 950 A.D. He fled from Norway to escape punishment for homicide, and settled on the w. coast of Iceland. Another homicide compelled his flight from that country, and in 984 he went to Greenland, which had been discovered by Gunnbjörn 100 years before, but not settled. He gave the strange land its incongruous name to attract settlers, and became the leading man in the colony, calling the chief town Gardar. The settlements flourished for about four centuries, when they suddenly disappeared from history, and were remembered only as "the lost colonies of Greenland." It is supposed that the entire people were carried off by the plague known as the "black death," in the latter part of the 14th century. Eric is erroneously set down in some books as the discoverer of the American continent. It was his son Leif Ericsson who first landed on the continent somewhere in New England in the year 1000, and he had been preceded by Bjarne Hierulfson, who sailed along Labrador and Newfoundland in the year 986, but did not land.

ERICÆE, or **ERICA'CEÆ**, a natural order of exogenous plants, consisting chiefly of small shrubs, but containing also some trees. The leaves are opposite or in whorls, entire, destitute of stipules, often small, generally evergreen and rigid. The flowers are sometimes solitary in the axils of the leaves, sometimes grouped in different modes of inflorescence, and are often of great beauty, in which respect no order of plants excels this; the beauty of the smallest species, and of those which have very small flowers, rivaling that of others which are trees profusely covered with magnificent clusters. About 900 species of this order are known, of which the greater number are natives of South Africa, which particularly abounds in the genus *erica*, and its allies—the true heaths (q.v.)—although some of them are also found to the utmost limits of northern vegetation. They are rare within the tropics, and only occur at considerable

elevations. Few species are found in Australia. Many of the E. are *social* plants, and a single species sometimes covers great tracts, constituting their principal vegetation. This is most strikingly exemplified in the heaths of Europe and the north of Asia. Medicinal properties exist in some of the E., as the BEARBERRY (see ARBUTUS). The GROUND LAUREL of North America (*epigæa repens*), also called TRAILING ARBUTUS and MAY-FLOWER, is a general favorite (see FLOWERS, NATIONAL). Narcotic and poisonous qualities are of not unfrequent occurrence. See ANDROMEDA, AZALEA, KALMIA, LEDUM, RHODODENDRON. The berries of some species are edible (see ARBUTUS and GAULTHERIA), although none are much esteemed.—The RHODODENDREÆ have sometimes been regarded as a distinct order, but are generally considered a suborder of E., containing the genera *rhododendron*, *azalea*, *kalmia*, *ledum*, etc. The larger leaves and flowers, and generally also the larger plants of the order, belong to this suborder; which, however, contains also many small shrubs of subarctic and elevated mountainous regions.

ERICHSEN, JOHN ERIC, b. London, 1818; received his medical education at University coll., London, and became prof. of surgery in that institution, 1850. He was pres. of the royal coll. of surgeons of England, surgeon extraordinary to the queen, and had other distinctions. He was the author of several surgical books and pamphlets, especially *The Science and Art of Surgery*, a standard work in England and America, which has been translated into several languages. He d. in 1896.

ERICHT, or **ERROCHT**, LOCH, lies in the n.w. of Perthshire and s. of Inverness-shire, in an uninhabited district, the wildest and most inaccessible in Scotland, amid the Grampian mountains. Its banks rise steeply from the water's edge. It is 14 m. long and nearly 1 m. broad, and it extends in a s.w. direction from near Dalwhinnie on the Dunkeld and Inverness road. By one outlet it joins Loch Rannoch, and by another it runs into Loch Lydoch, its waters ultimately reaching the Tay. Its surface is about 1500 ft. above the sea, and it never freezes. In a cave at the s. end of the loch, prince Charles lay hid in 1746.

ERICSSON, JOHN, a distinguished engineer, was b. in Sweden in 1803. After serving for some time as an officer of engineers in the Swedish army, he removed in 1826 to England, and continued to occupy himself with improvements chiefly on steam machinery. He came to New York in 1839, and two years afterwards was employed on the war-steamer *Princeton* (the first war-steamer having its propelling machinery below the water-line), his own invention of the screw-propeller being used. E. soon became known for the great number and novelty of his inventions, some of which were a steam-boiler with artificial draught, which did away with smoke-stacks and effected an important saving in fuel (this invention was at once applied to railway locomotives); a steam fire-engine; the caloric engine; the screw propeller for steam navigation; a sliding telescopic chimney; machinery to check the recoil of heavy guns; an instrument for measuring distances at sea; the hydrostatic gauge for measuring the volume of fluids under pressure; a meter to measure the amount of water passing through pipes; an alarm barometer; a pyrometer to measure temperature from the freezing of water to the melting of iron; a lead to take soundings without rounding the vessel to the wind; and various modifications of his caloric engine. In the war of the secession he was engaged in building "monitors" (so called from the name of the first one), iron ships with revolving iron turrets for the guns. The first one was built in a little more than three months, and, Mar. 9, 1862, defeated and disabled the confederate iron-clad *Merrimac*. In his later years he attempted to perfect the solar engine, for which heat is obtained from the rays of the sun collected by a huge funnel lined with a reflecting surface. D. 1889. In 1890 the body of Ericsson was removed to Sweden, being conveyed by the United States cruiser *Baltimore*, and in 1893 the state of New York erected a monument to him on the Battery, New York City. See Church, *Life of Ericsson* (1890).

ERIDANUS. See Po.

ERIE, one of the five great lakes which empty themselves by the St. Lawrence, separates Upper Canada on its left from Michigan, Ohio, Pennsylvania, and New York on its right. It is the most southern of the five, receiving at its south-western extremity the waters of lakes Superior, Michigan, and Huron by the river Detroit, and discharging them at its n.e. by the Niagara into lake Ontario. With a length of 240 m., E. has a breadth varying from 30 to nearly 60 m., with an area of 9,600 sq. miles. It is 16 ft. below the Huron, and 333 and 573 respectively above the Ontario and the Atlantic. At its south-western extremity are several wooded and partly cultivated islands, the largest of which is about 14 m. in circumference. It is by far the shallowest of the five great lakes. Its mean depth is stated at 120 ft.; and from this comparative shallowness and the consequent liability to a heavy ground-swell, as well as on account of the small number of good harbors, the navigation is peculiarly difficult and dangerous. The chief harbors on the s., or United States shore, besides the natural harbor of E. itself or Presque Isle, are those of Cleveland, Sandusky City, and Toledo; and on the n. or Canadian shore, ports Dover, Burwell, and Stanley. Lake E. receives no rivers of any consequence. Its commercial importance, however, has been largely increased by art. It is connected by one canal with the Hudson, and by more than one with the Ohio; while, on the British side, it communicates with the Ontario by means of a still more available work, the ship-channel of the Welland. Its navigation generally closes in the beginning of Dec., and the lake remains more or less frozen till Mar. or April. The commercial

importance of this lake has been greatly enhanced the last few years by the establishment of numerous lines of railway connecting its ports with the interior. The amount of traffic on the lake and on these railways is enormous. Lake E. was the scene of a naval engagement between the British and Americans, Sept. 10, 1813.

ERIE, a co. in w. New York, on Lake Erie and Niagara River; 996 sq.m.; pop. '90, 322,981. Co. seat, Buffalo.

ERIE, a co. in n. Ohio, on Lake Erie, drained by Vermilion and Huron Rivers. 260 sq.m.; pop. '90, 35,462. Co. seat, Sandusky.

ERIE, a co. in n.w. Pennsylvania, on Lake Erie between New York and Ohio; 770 sq.m.; pop. '90, 86,074. Co. seat, Erie.

ERIE, city, port of entry, and co. seat of Erie co. Penn., on Lake Erie, 85 miles s.w. of Buffalo and 100 miles n.e. of Cleveland. It occupies the site of a French fort built in 1749, and was laid out in 1795; was incorporated as a borough in 1805, and chartered as a city in 1851. It was the headquarters of Commodore Perry in the war of 1812, and the fleet with which he defeated the British in the naval battle of Put-in-Bay was built and equipped here. The city lies on an elevated bluff, overlooking the lake; the streets are broad, intersecting at right angles. The Union railroad depot is a fine building, 480 feet in length and 88 in width. The handsome Government Building contains the Custom-house, Post-office, and other departments. There are a city hall and an opera house, numerous churches, five national banks, daily and weekly periodicals, a public park containing a soldiers' monument and two fountains, the State Soldiers' and Sailors' Home on Garrison Hill; the Hamot hospital, St. Vincent hospital, Protestant Home for the Friendless, U. S. Marine hospital, and public library. The public schools are well organized, and the Central School occupies a large and attractive building. Near the city is a memorial in the form of a block-house, erected by the State in honor of Anthony Wayne. Natural gas was discovered here in 1889; electric lights and electric street railroads have been introduced, and the water system is excellent. Erie is the only lake port in Pennsylvania, and has the largest land-locked harbor on Lake Erie. It is enclosed by Presque Island, and a breakwater, is nearly five miles long and a mile wide, has a depth of nine to twenty-five feet, and has three lighthouses. The docks are provided with every facility for the transfer of merchandise to and from the railroads. Erie receives a large part of the shipping of the Great Lakes; and the extensive coastwise trade is carried on by steamers and sailing vessels. The principal articles of shipment are lumber, coal, iron ore, and petroleum. Erie is also an important railroad centre, being on the New York, Chicago, and St. Louis, the Pennsylvania, the Lake Shore and Michigan Southern, the Pittsburgh, Shenango and Lake Erie, and the Philadelphia and Erie railroads. The chief industries are the manufacture of boilers and steam-engines, pianos, organs, hollow-ware, stoves, machinery, car-wheels, bricks, leather, pumps, furniture, etc. Pop. '90, 40,634.

ERIE, BATTLE OF LAKE, a naval engagement in the war of 1812 between Great Britain and the United States, fought in Put-in bay, near the western end of lake Erie, Sept. 10, 1813. The American fleet, which had been built at Erie, ran the British blockade on the 12th of August, and sailed west. It consisted of 9 vessels, with 54 guns and 490 officers and men. The British had 6 vessels, mounting in all 63 guns, with 502 officers and men. Only 2 vessels of the American squadron were in the proper sense vessels of war, the others having been built for trade. The American guns, though of heavier caliber, were of shorter range than those of the British; but the American fleet had an advantage in the better quality of its seamen. The American commandant was Lieut. Oliver Hazard Perry. At the opening of the battle Perry's flag-ship *Lawrence* was disabled, but he left her in command of Lieut. Yarnall and shifted his flag to the *Niagara* under a heavy fire. The remainder of the fleet now joined in the attack upon the enemy, compelling the almost immediate surrender of the British flag-ship *Detroit* and three other vessels. The remaining two attempted to escape, but were overtaken and captured. Perry at once sent a dispatch to Gen. Harrison, saying, "We have met the enemy, and they are ours—two ships, two brigs, one schooner, and one sloop." The battle lasted 3 hours, and about 13 men were killed and wounded on each side. The American supremacy on the lakes being established, Detroit was evacuated by the British, and peace established in Michigan. Gold medals were conferred by congress upon Perry and Elliott, the leaders in the battle, and minor rewards upon the other officers and men. In 1858, the remains of the officers killed were buried on Put-in-Bay Island.

ERIE CANAL, connecting the Hudson river at Albany and Troy with lake Erie at Buffalo, is 363 m. in length. It was begun in 1817, and completed in 1825, at a cost of \$7,602,000. Its construction is due chiefly to the foresight and energy of De Witt Clinton, and while it was in progress it was often ridiculed by self-complacent skeptics as "Clinton's big ditch." The enterprise was undertaken and carried through by the state of New York, Clinton being governor during nearly all the period of its progress. As its route lay chiefly through an uninhabited wilderness, it opened for settlement an immense territory. It was subsequently enlarged, and is now 70 ft. broad at the surface, and 56 ft. at the bottom, with a depth of 7 feet. The locks, 72 in number, 57 of

which are double, and 15 single, are 110 ft. long and 18 ft. wide. It is carried by great stone aqueducts across several large streams, and in some places it is cut through solid rock. It is supplied with water from lake Erie, 142 m. from Buffalo to Seneca river. Most of the flow of water is from the w. towards the e., the only exception being between Lodi and the Seneca river, where there is a fall westward through 5 locks. At Rome, a little w. of Utica, a supply of water is received from the Black river canal. Between Rome and Syracuse water is drawn from Cazenovia lake and other reservoirs, while at Syracuse it supplies water to the Oswego canal. Buffalo is 568 ft. above the level of the Hudson at Albany, the difference being overcome by locks at various points. The canal has been immensely successful, contributing largely to the growth of New York, Buffalo, and intermediate places. In 1896 it was estimated that the cost of construction and improvements had aggregated \$52,540,800, and the expenditure of \$9,000,000 more for enlargement was authorized by popular vote in that year.

ERIES, an Indian tribe of the same family as the Hurons and the Iroquois, or Six Nations, once dwelling in the neighborhood of Niagara falls, but forced inland by hostile tribes. About 1653, they were attacked by the Iroquois, and in 1656, nearly exterminated. Those who remained of the tribe became incorporated with the Senecas.

ERIE SHALE, a name given to the extension w. of the Upper Portage and Chemung rocks of New York. It overlies the Huron shale, the latter being the storehouse of petroleum.

ERIGENA, JOANNES SCOTUS, a famous philosopher of the middle ages, was b. probably in Ireland, and flourished during the 9th century. Very little is known regarding his history. He appears to have resided principally in France, at the court of Charles the bald. In the controversies of his time, regarding predestination and transubstantiation, he took part. His philosophic opinions were those of a Neo-Platonist rather than of a scholastic. His love for the mystic doctrines of the old Alexandrian philosophers was shown by his translation of the writings ascribed to Dionysius the Areopagite, which proved to be a wellspring of mysticism during the middle ages. E. held that God is the essential ground of all things, from whom all things emanate, and into whom they return again. Pantheism, therefore, lurks in his system. His principal work is *De Divisione Naturæ* (published by Gale, Oxford, 1681). One of its leading thoughts is the identity of philosophy and religion, when both are properly apprehended. E. uttered his opinions with great boldness, and he exhibited no less subtlety and strength of intellect in their defense. He expressed his contempt for theological dogmatism, and vindicated the authority of reason over all other authority. His words are: "Authority is derived from reason, and not reason from authority; and when the former is not confirmed by the latter, it possesses no value." Consult Hjort's *Joh. E.* (Copenh. 1823); Staudenmayer, *Joh. E.* (Frankfort, 1834); and Taillandier, *Scot. E. et la Philosophie Scholastique* (Strasb. 1843); Möller, *Scotus E.* (1844); Christlieb, *Leben und Lehre des Scotus E.* (1861); and Buchwald, *Leben* (1884).

ERIGENIA (Gr. *erigenes*, born in the spring), a genus of plants belonging to the natural order *umbellifera*; described as follows: calyx-teeth obsolete, petals obovate or spatulate, flat, entire. Fruit twin; the carpels incurved at top and bottom, nearly kidney-form with five very slender ribs, and several oil-tubes in the interstices, the inner face of the reed hollowed into a broad deep cavity. A small and smooth vernal plant with tuberous root, producing one or two divided leaves and a leafy-bracted umbel, from three to nine inches high, of a few white flowers. *E. bulbosa*, popularly called **HARBINGER OF SPRING**, occurs in alluvial soil from western New York and Pennsylvania to Wisconsin, Kentucky and southward.

ERIGERON, a genus of plants of the natural order *compositæ*, sub-order *corymbifera*, having heads (flowers) of many florets, the florets of the ray numerous, in several rows, of a different color from those of the disk. Two or three species are natives of Britain, the most common of which, *E. acris*, has a stem 16 to 18 in. high, narrow entire leaves, flower-stalks forming a kind of corymb, flowers with yellow disk and pale-blue ray. It has a powerful odor, which is said to keep away fleas, and the name **FLEA-BANE** is sometimes given to the plant. Its ashes contain about 5 per cent of potash, for the sake of which it is sometimes collected and burned. *E. Philadelphicum*, a native of North America, with pale-purple ray, and a fetid smell, is valued in the United States as a diuretic.

ERIN, a Celtic name for Ireland (q.v.)

ERINACEUS and **ERINACEADÆ**. See **HEDGEHOG**.

ERINNA, a Greek poetess, concerning the date of whose birth the most different statements are advanced. According to some, she was the intimate friend of Sappho (hence she is likewise called the Lesbian singer), and was born at Rhodes, or on the little island of Telos, situated w. of Rhodes; while others maintain that she lived in the age of Demosthenes; and others again, perplexed by such a wide difference in point of time, have recourse to the hypothesis of two poetesses of this name. E. acquired such celebrity by her epic, epigrammatic, and lyric poems, that her verses were compared with those of Homer, although she died at the early age of 19. The genuineness of the fragments that still exist under her name, has been disputed on good grounds. These

have been collected by Schneidewin in the *Delectus Poesis Graeca Elegiacæ* (Göttingen, 1838). Compare Malzow, *De Erinnae Lesbii vita et Reliquiis* (Petersburg, 1836).

ERIN'YES. See EUMENIDES.

ERIOBO'TRYA. See LOQUAT.

ERIOCAULA CÆÆ, a natural order of endogenous plants, nearly allied to *restiaceæ*, and containing about 200 known species, many of which are aquatic or marsh plants. The E. are chiefly natives of the tropical parts of America and Australia. One species, *ericaulon septangulare*, JOINTED PIPEWORT, is found in the w. of Ireland, and in some of the Hebrides; a little grass-like plant, growing in lakes which have a muddy bottom, and exhibiting small globular heads of flowers. From its botanical affinities, and with reference to geographical distribution, no British plant is more interesting. The E. form a remarkable feature of the vegetation of some parts of South America; but many of the species bear little resemblance to their humble northern congener, being almost shrubby, 4 to 6 ft. high, with leafy, much-branched stems, "each branchlet terminated by a large white ball, composed of a vast number of smaller heads, placed on peduncles of unequal length." Many of them also grow on arid mountainous regions, others in flat sandy grounds, which are flooded in the wet season.—Gardner's *Travels in Brazil*.

ERIODEN'DRON, a genus of trees of the natural order *sterculiaceæ*, natives of tropical countries, the thick woody capsules of which contain a kind of wool surrounding the seeds. These trees are therefore sometimes called WOOL-TREES. The wool of *E. samanna* is used in Brazil for stuffing pillows. *E. anfractuosum*, of which one variety, found in the East Indies, is sometimes called *E. Indicum*, and another, found in Africa, *E. guineense*, is a tree of great height, 150 ft. or more. The African variety or species is called RIMI and BENTANG. Park mentions it by the latter name. Barth says it is generally to be seen growing near the principal gate of large towns in Hansa. Its wood is soft and spongy, chiefly used for making canoes. The seeds of *E. Indicum* are eaten in Celebes. They are roundish, and of the size of peas. The trees of this genus have palmate leaves. The flowers are large and beautiful.

ERIS, in Greek mythology, sister of Mars, daughter of Nyx (night), and sister of Nemesis. Eris, or "strife," is represented at first as insignificant, but growing until her head touches the heavens. It was Eris who at the marriage festival of Peleus and Thetis flung on the table the golden apple inscribed to the fairest of the fair, for which Juno, Venus, and Minerva contended. Virgil gives Eris the name of Discordia.

ERITREA, an Italian colony on the Red Sea, extending from Cape Kasar to the sultanate of Raheita, and having a coast-line of about 670 miles, an area of 88,500 sq. m., and population estimated at 450,000. A treaty with Egypt in 1891 determined its boundary on the Egyptian side and a treaty with Abyssinia, in 1889, fixed the boundaries between it and the latter country. In 1895 the Italians occupied Kassala, and, after a war with Abyssinia, annexed the province of Tigré, but they were unable to retain the Abyssinian territory. King Menelek having won the decisive victory of Adowa in 1896, regained all the country to the south of the Mareb, Belesa, and Muna rivers, and secured the recognition of the absolute independence of the country. Throughout the colony agriculture is in a backward condition, the summer droughts necessitating extensive irrigation for the raising of crops. There is abundant pasturage, and the population is mainly engaged in the raising of herds, but it is to a great extent nomadic. Massowah, with a population of 7775 in 1893, is the capital of the colony. A railway, seventeen miles in length, connects it with Saate.

ERIVAN', or IRWAN, a government of Russia on the borders of Persia, Georgia, and Armenia; 10,670 sq. m.; pop. '92, 703,511. The largest river is the Aras, or Araxes, and Ararat is the principal mountain. There are valuable mines of gold and other minerals, and salt is produced in large quantities. Chief town, Erivan.

ERIWAN' (Persian *Rewdn*), the fortified capital of Russian Armenia, situated to the north of Ararat, in the elevated plain of Aras or Araxes, lat. 40° 10' n., long. 44° 32' e., 3,312 ft. above the level of the sea. It consists of the town properly so called, and the fortress, which is surrounded on three sides by high walls, and provided with aqueducts, a stone bridge over the Zenga, which here falls into the Araxes. E. was formerly the capital of the Persian province of Aran, celebrated for its silk. During the war between Russia and Persia, E. was stormed by the Russian gen., Paskewitsch, who received the surname of Eriwanski; and by the treaty of peace concluded at Turkmanjai, 22d Feb., 1828, it was given up by Persia to Russia, along with the province of the same name. It is now an important Russian post, as in former times it formed the bulwark of Persia against the Turks, and afterwards against Russia. Pop. '90, 12,449.

ER'LANGEN, a t. of Bavaria, is situated in the midst of a well cultivated district, on the right bank of the Regnitz, 10 m. n. of Nürnberg. It is a handsome town, and is surrounded by walls pierced by seven gates. It is divided into the old and new towns, the latter founded in 1686 by Christian, markgraf of Bayreuth. E. is the seat of a university, of a gymnasium, of agricultural and industrial schools, and other institutions. The university, however, is the chief building. It was founded in 1742, and is celebrated as a school of Protestant theology, has a library, zoological and mineralogical collections, etc. E. owes its prosperity to the migration thither of a number of refugees from

France, who were compelled to flee on the revocation of the edict of Nantes, and who introduced many new branches of manufacture at Erlangen. It has various manufactories and is specially known for its breweries. E. became a Bavarian possession by the treaty of 1809. Pop. '90, 17,559.

ERLAU (Hung. *Eger*), an episcopal city of Hungary, in the co. of Heves, of which it is capital, is situated on both banks of the river Erlau, in a delightful valley skirted with vine-clad hills. It is surrounded by old walls. The principal buildings are the lyceum, with a valuable library, and an observatory 172 ft. high; the cathedral, the episcopal palace, the Franciscan and the Minorite monasteries, a richly embellished Greek church, a county hall, and the new barracks. E. has also a gymnasium, an episcopal seminary, a normal and drawing school, a hospital founded in 1730, and other important institutions. The cultivation of the vine is the principal occupation of the inhabitants. The famous E. wine is produced in considerable quantities. Pop. '90, 22,427, most of whom are Roman Catholic in religion, and Magyar in race. E. owes its importance to the very old bishopric founded here by St. Stephen in the beginning of the 11th c., and which, in 1804, was raised to an archbishopric.

ERLKÖNIG, in German, is the name applied to a poetical, personified, natural power which, according to German poetical authorities, prepares mischief and ruin for men, and especially for children, through delusive seductions. The name, not connected with the root *erle*, is synonymous with *Elfen König*. The E. was introduced into German poetry from the Sagas of the north, through Herder's translation of the *Erlekönig's Daughter* from the Danish, and has become universally known through Goethe's ballad of the *Erlekönig*, set to music with remarkable power by Schubert.

ERMAN, ADOLPH, Egyptologist, the son of Georg Adolph Erman; born in Berlin in 1854; educated at Leipsic and became extraordinary professor, 1883, and ordinary professor, 1892, in the Leipsic University. In 1885 he was appointed director of the Egyptian division of the Royal Museum. Among his writings are *Die Pluralbildung des Ägyptischen* (1878); *Neu-ägyptische Grammatik* (1880); *Deutsche Medaillene des 16. und 17. Jahrhunderts* (1884); *Ägypten und Ägyptisches Leben in Altertum* (1885-7); *Die Sprache des Papyrus Westcar* (1889); *Die Märchen des Papyrus Westcar* (1890); *Ägyptische Grammatik* (1894). In 1889 he became associated with Brugsch in the publication of the *Zeitschrift für Ägyptische Sprache*, etc.

ERMAN, GEORG ADOLPH, son of Paul; b. Germany, 1806. In 1828-30, he traveled around the world chiefly to make observations in magnetism, and published an account of his journey, from which the portion describing Siberia was translated into English. Erman published other works on plants and animals, and after 1841 was the principal editor of a scientific publication chiefly concerning Russia. He was also for a number of years professor of physical science in the university of Berlin. He d. 1877.

ERMAN, PAUL, 1764-1851; b. Berlin. At first intending to study for ordination in the church, he turned to pursue physical sciences and became a teacher in the French gymnasium in Berlin, and later in the military academy. When the university of Berlin was founded he was chosen professor of physics, and held the office until his death. He made important discoveries in electricity, magnetism, optics, and physiology, and wrote valuable works on these subjects.

ERMELAND, an old division of Poland, now a district in East Prussia, extending about 50 miles from northwest to southeast. *It is a Roman Catholic diocese.

ERMONVILLE, a village in the s.e. of the department of Oise, in France, in the possession of the Girardin family. It is celebrated for its beautiful and extensive parks, and as being the resting-place of Rousseau, for which reason it is much visited in summer by strangers from Paris. It was also the residence of Gabrielle d'Estrées, the mistress of Henry IV., who inhabited a hunting-tower, part of which is still standing, and bears her name. It became still more celebrated after the death of Rousseau in 1778. During the revolution, his ashes were removed to the Pantheon, but conveyed back to E. after the restoration. It had nearly been purchased by the *Bande Noire*, but a larger sum was offered by Stanislaus de Girardin, the well-known liberal deputy, and E. was preserved for the lovers of art, of nature, and of historical monuments.

ERMINE, white fur, with black spots; the reverse of which, or a black fur with white spots, also used in heraldry, is called *contre ermine*. E. is commonly used to difference the arms of any member of a family who is connected with the law. A cross composed of four E. spots is said to be a cross ermine. See MINIVER.

ERMINE, or STOAT, *Mustela erminea*, a species of weasel (q.v.), considerably larger than the common weasel, but much resembling it in general form and other characters, as well as in habits. The E. is almost 10 in. in length, exclusive of the tail, which is fully 4½ in. long. It is of a pale reddish-brown color in summer, the under parts yellowish-white, the tip of the tail black; in winter—in cold countries or severe seasons—the upper parts change to a yellowish-white or almost pure white, the tip of the tail, however, *always* remaining black. This change takes place more frequently in the northern than in the southern parts of Britain, but sometimes even in the s. of England; and when it is only partially accomplished, the animal presents a piebald appearance, and very often remains so during the milder winters of Britain. It is in its winter dress that it is called E., and yields a highly valued fur; more valuable, however, when obtained from the coldest northern regions than from more southern and temperate

countries. In its summer dress it is called stoat. It displays indomitable perseverance in the pursuit of its prey, which consists very much of rats, watervoles, and other such small quadrupeds; with young hares and rabbits, grouse, partridges, etc. The eggs of birds are as welcome to it as the birds themselves. The E. is a native of all the northern parts of the world. Its range extends even to the s. of Europe. It delights in moorish districts, and is tolerably abundant in the n. of Scotland. It is from Norway, Lapland, Siberia, and the Hudson's bay territories that the E. skins of commerce are obtained, which are used not only for ladies' winter garments, but for the robes of kings and nobles, and for their crowns and coronets. E. has thus obtained a distinct recognition in heraldry. In making up E. fur, the tails are inserted in a regular manner, so that their rich black shall contrast with the pure white of the rest of the fur.

ERNE, a river and lake in the s.w. of Ulster province, Ireland. The river rises in the s. of Cavan co., in the small but beautiful lough Cowna. It runs n. and n.w., merging in lough Oughter, in Cavan co., and in lough Erne in Fermanagh co., and passes Enniskillen and Ballyshannon. It then flows through the s. corner of Donegal co. into Donegal bay. It has a total course of 60 miles. On the river, at Ballyshannon is a salmon-leap fall, over a rocky ledge 20 ft. high and 150 yards broad, and the river leaps over another rocky ledge near Belleek, $2\frac{1}{2}$ m. below the lower end of the loch. Lough Erne, one of the finest lochs in the kingdom, is the most attractive feature of Fermanagh co., which it bisects lengthways, and almost entirely drains. It extends 40 m. from s.e. to n.w., and consists of two lakes, the upper and lower, joined by a narrower part 10 m. long, and assuming in parts the character of a river, with Enniskillen midway between the two lakes. The upper lough is 12 by 4 m. in extent, 10 to 75 ft. deep, 151 ft. above the sea, and has 90 green hilly islets. The lower lough is 20 by $7\frac{1}{2}$ m. in extent, 100 to 266 ft. deep, 148 ft. above the sea, and has 109 similar islets. On one of the islets is a round tower. They contain salmon, trout, pike, bream, and eels. The scenery around is singularly varied and beautiful.

ERNE, *Haliaeetus*, a genus of birds of the family *falconidae*, and of the eagle group; differing from the true eagles in the greater length of the bill, in the toes and lower part of the tarsi being destitute of feathers, and generally, also, in frequenting the sea-coast and the banks of lakes and rivers to feed on fish, in feeding like vultures on carrion almost as readily as on newly killed prey, and in inferior courage. The only British species is the **COMMON E.** (*H. albicilla*), also known as the sea eagle or white-tailed sea eagle. It is much more common in Britain than the golden eagle, is sometimes seen even in the s. of England and in inland districts, occasionally visiting deer-parks to prey on very young fawns or to devour dead deer; but is of more frequent occurrence in the n. of Scotland, doing considerable injury to flocks in Sutherlandshire, particularly during the season of young lambs. Its favorite haunts, where it roosts and makes its nest, are the shelves and ledges of stupendous precipices on the coast, where its scream often mingles with the noise of the perpetual surge. It sometimes also breeds on crags beside inland lakes, as at the lakes of Killarney, and more rarely even on trees. Fishes are certainly its favorite food, although its mode of procuring them is not well known; but water-fowl are also its very frequent prey. It is found in most parts of Europe, and even in the islands of the Mediterranean, but is more abundant in the n. of Europe and in Siberia. It is not known as a native of America. In size, the E. is inferior to the golden eagle, being seldom more than 33 in. in its whole length. The general color of the plumage is brown, the head having a paler yellowish tinge, the tail in the adult bird is pure white. The young, sometimes called the cinereous eagle, has a grayer plumage and mottled tail.—Another notable species of this genus is the **WHITE-HEADED E.** (*H. leucocephalus*) of America, also called the white-headed eagle, bald eagle, and sea eagle, the chosen symbol of the United States. It is a bird of about the same size with the common E., with dark-brown plumage, and—in an adult state—the head, neck, tail, and belly white. It is found in almost all parts of North America, visiting the arctic regions in summer, but abounding chiefly in the southern states between the Atlantic and the Mississippi. It frequents both the sea-coast and the lakes and rivers, and may be often seen sailing through the column of spray at the falls of Niagara. It is very fond of fish, which it procures by wading in shallow streams, and also by compelling the osprey to relinquish prey just taken. The soaring and evolutions of the birds in the air on such occasions are described as sublime. The white-headed E. feeds also on lambs, fawns, poultry, &c.; kills swans, geese, and other water-fowl; and does not disdain to compel vultures to disgorge for its use the carrion which they have swallowed. On account of its habits and dispositions, Franklin expressed his regret that it had been chosen as the symbol of his country.—More nearly resembling the common E. is another North American species, the **BIRD OF WASHINGTON** (*H. Washingtonii*).—Australia produces a beautiful species (*H. leucogaster*), and numerous species are found in other parts of the world, amongst which are some of comparatively small size, as the **PONDICHERY KITE** or **BRAHMAN KITE** (*H. ponticerianus*) of India, which is constantly to be seen fishing like a gull in the rivers of that country, and is by the Hindus considered sacred to Vishnu.

ERNEST AUGUSTUS, 1771–1851; fifth son of George III. of England. As duke of Cumberland he was for a long time a member of the house of lords, where he was an

extreme tory. When his brother William IV. died, 1837, he became king of Hanover, where he became notorious for tyranny and licentiousness. His blind son George was his successor, reigning until Hanover was annexed to Prussia.

ERNESTI, JON. AUG., the founder of a new school of theology and philosophy, was b. at Tennstädt, in Thuringia, 4th Aug., 1707. He studied at Pforta, Wittenberg, and Leipsic; but after having been appointed rector of the Thomas school in Liepsic, in 1734, turned his attention chiefly to the old classical literature, and the studies connected with it. In 1742, he became professor extraordinary of ancient literature in the university of Leipsic; in 1756, professor of rhetoric; in 1759, professor of theology; and died 11th Sept., 1781. E. paved the way to theological eminence by a thorough study of philology, and was thus led to a more correct exegesis of the Biblical authors, and to more liberal views of theology in general. In fact, it is mainly to him that we owe the proper method of theological exposition, in so far as it rests upon correct grammatical elucidation. He showed his ability as an accurate critic and grammarian, in his editions of Xenophon's *Memorabilia of Socrates*; the *Clouds* of Aristophanes, *Homer*, *Callimachus*, *Polybius*, *Suetonius*, and *Tacitus*; but above all, by his admirable edition of Cicero (5 vols., Leip., 1737-39), to which he added a *Clavis Ciceroniana*, by way of supplement. He was also the first reviver of true and manly eloquence in Germany. His theological writings are numerous. The most remarkable are the *Initia Doctrinæ Solidioris*; the *Institutio Interpretis Novi Testamenti* (translated into English); the *Anti-Muratorius* (1755); and the *Opuscula Theologica* (1792). Compare Bauer, *Formule ac disciplinæ Ernestianæ indoles* (1782); Stallbaum, *Die Thomas-schule zu Leipzig* (1839).

ERNST, elector of Saxony, the founder of the Ernestinian line, or the elder branch of the princely house of Saxony, b. 1441, eldest son of the elector Friedrich the Mild, and of Margaret, archduchess of Austria. When only 14 years of age, he was seized and carried off from the castle of Altenburg, along with his brother Albrecht, but was speedily recaptured. This incident, known in German history as the stealing of the princes (*Prinzenraub*), has been described with extraordinary vividness by Carlyle in the *Westminster Review*, Jan., 1855. He succeeded to the electoral dignity on the death of his father in 1464, but governed in common with his brother for 21 years. In 1485, however, E. and Albrecht divided the paternal possessions, when the former obtained as his share Thuringia, the half of the district then called Osterland, with Voigtland, the Franconian estates of the house, the electoral dignity, and the dukedom of Saxony. E. was a man who took a great interest in the welfare of his people. Against injustice, tyranny, and lawlessness, he was implacable. He died at Kolditz in 1486. It is next to impossible to trace the course of the Ernestinian line through the labyrinthine mazes of the endless German genealogies; it is sufficient to say that after 1638, the Ernestinian line was represented by the dukes of Weimar, who gradually obtained the whole possessions of the house. Johann, duke of Weimar, who died in 1605, left several sons, the eldest of whom, Wilhelm, became the founder of four different branches, all of which, however, were reunited under Ernst August, duke of Weimar, who died in 1748. After 1815, the duchy of Weimar became the grand-duchy of Saxe-Weimar-Eisenach, and its present ruler is of course the direct representative of the Ernestinian line. The other three families by which it is now also represented are those of Meiningen, Saxe-Coburg-Gotha, and Altenburg.

ERNST I., surnamed the Pious, duke of Saxe-Gotha and Altenburg, founder of the house of Gotha, was b. at the castle of Altenburg, 24th Dec., 1601. He was the son of that Johann, duke of Weimar, mentioned in the previous article, who died in 1605, and was thus connected with the main Ernestinian line. E. was the ninth of ten brothers, the youngest of whom was the famous Bernhard (q.v.) von Weimar. He received an excellent education from his mother, Dorothea Maria von Anhalt. After the arrival of Gustavus Adolphus in Germany, E. entered the Swedish service, and in various engagements exhibited great courage and skill, completing the victory of the Protestants at Lützen, after the fall of Gustavus. After the battle of Nördlingen, 26th Aug., 1634, E. withdrew from the theater of strife, and for the rest of his life devoted himself to restoring the prosperity of his territories, which had been frightfully devastated during the thirty years' war. He died in 1675. Of his seven sons, the eldest, Friedrich, continued the line of Gotha, while the third became the founder of the house of Meiningen, and the seventh, the founder of the house of Saalfeld. E. is a fine type of the old German Protestant prince. Zealously attached to the doctrines and government of the Lutheran church, he exercised a constant watch over its religious and educational interests. With the formalism, however, that often characterizes "strictly religious" people, he compelled his children to learn the whole Bible by heart. He was much interested in the cause of Christianity abroad, and invited to his court the abbot Gregorius from Abyssinia, besides sending thither on a religious embassy Joh. Mich. Wansleb of Erfurt. He also carried on a correspondence with the king of Ethiopia and the patriarch of Alexandria. His line became extinct by the death of Friedrich IV. in 1825.

ERNST II. (AUGUST KARL JOHANNES LEOPOLD ALEXANDER EDUARD), duke of Saxe-Coburg-Gotha, elder brother of the late prince Albert (q.v.), b. at Coburg 21st June, 1818. Both brothers received an admirable literary and scientific education. The family to which he belongs is a branch of the Ernestinian line, having been founded in

1680 by Albrecht, second son of Ernst the pious (q.v.). When E. had completed a university curriculum at Bonn, he entered the military service of the king of Saxony, but left it on the occasion of his marriage with the daughter of the grand-duke of Baden. In 1844, E. succeeded his father as duke of Saxe-Coburg-Gotha. In his opinions and aspirations, imbued with the spirit of his age, he has introduced into his little dominions many beneficial reforms, and allayed not a few long-standing jealousies. Yet one regrets to say, that his enlightened views of his duty as a ruler have not been generally appreciated by his subjects. During the stormy period of 1848-49, by spontaneous concessions on the one hand, and on the other by an energetic repression of the political anarchists, he contrived to save his territories from the perils of revolution. In the Slesvig-Holstein war, E. took a prominent part, and on the 5th April, 1849, won the battle of Eckenförde. E. was a great advocate for the unity of the German nation, and took a prominent part in most of the efforts made in that direction. His leisure hours were devoted to music and the fine arts. His operas, *Casilda*, *Santa Chiara*, and *Diana von Solanges*, are well known in Germany. In 1861 he published a pamphlet vindicating his government, and in 1864 an account of a tour in Egypt. He died in 1893.

ERNST, HEINRICH WILHELM, an eminent violinist, b. at Brünn, in Moravia, in 1814. He early became a pupil of the Vienna conservatorium, studying under Seyfried and Mayseder. At the age of 16, his talents excited much interest on his appearance in public at Munich, Stuttgart, and Frankfurt; and he soon afterwards performed in Paris. His first visit to London was in 1843; and he returned in subsequent years, spending the intervals in Paris and in different parts of Germany. His playing was characterized by immense brilliancy, combined with passion and sentiment. He suffered much from acute neuralgia, which latterly interfered with the exercise of his art; and the last seven years of his life were spent at Nice, where he died Oct. 8, 1865. E.'s compositions have generally a bravura character, and include works for the violin and orchestra, quartettes, etc.

EROS. See CUPID.

EROSION, the influence of a stream or river in hollowing out its channel. Even the smallest streams, when running over soft strata, as clay or sand, cut out channels, and remove the eroded materials. Hollows thus produced have been observed among the stratified rocks. One that occurs in the coalfield of the forest of Dean has been carefully described. The trough was found to branch, when traced in the progress of mining, over a considerable area, and to assume all the appearances of a little stream, with small tributaries falling into it. When the hollows thus abraded are of considerable extent, "*valleys of erosion*" are produced. Many of the earlier geologists held that rivers had hollowed out their own valleys. The immense amount of materials brought down by rivers, and deposited at their mouths as deltas, shows without doubt that they have contributed materially to produce inequalities on the earth's surface; but the examination of the geological structure of valleys, plainly testifies that almost every great hydrographical basin has derived its form originally from some other agency, although its outline may have been subsequently altered by the continued action of currents within it.

EROSTRATUS. See HEROSTRATUS.

EROTIC (from the Greek *eros*, love), signifying in general whatever is marked by love or passion; but the term is chiefly applied to poetical pieces of which love is the predominating subject.

EROTOMANIA, a species of mental alienation caused by love. See MANIA.

ERPENIUS (Latinized from Thomas van Erpen), one of the earliest and most eminent of European orientalists, was b. at Gorkum, in Holland, 7th Sept., 1584. At an early age, he was sent to Leyden, where he directed his attention first to theology, but afterwards more particularly to the study of oriental languages. Having completed his educational course, he traveled through England, France, Italy, and Germany; and in 1613, became professor of oriental languages at Leyden. Here he erected an Arabic press in his own house, caused new types to be cut, and not only wrote but printed a great number of important works bearing on his favorite studies. The professorship of Hebrew not being vacant at the time of E.'s translation to the university of Leyden, a second Hebrew chair was founded expressly for him in 1619. Soon after this he was appointed oriental interpreter to the government, in which capacity he read and wrote replies to all official documents coming from the east. Such was the elegance and purity of his Arabic, as written at this time, that it is said to have excited the admiration of the emperor of Morocco. Towards the close of his life, tempting offers of honors and distinction came pouring in upon him from all parts of Europe; but he was never prevailed upon to leave his native country, where, in the midst of an eminent career, he died 13th Nov., 1624. Although the present standard of oriental knowledge in Europe is much in advance of that of E.'s day, there is no doubt that it was through him principally that eastern, especially Arabic studies have become what they are. With hardly any better material than a few awkwardly printed Arabic alphabets, he contrived to write his famous grammar (*Grammatica Arabica, quinque libris methodice explicata*, Leyden, 1613; recent edition by Michaelis, Gött. 1771), which for 200 years,

till the time of Silvestre de Sacy, enjoyed an undisputed supremacy; and there are many who think his *Rudimenta* unsurpassed, even at the present day, as a work for beginners. Among his other important works the best known is his *Proverbiorum Arabicorum Centuriæ Duæ* (Leyden, 1614).

ERRATA, the list of errors with their corrections placed at the end of a book. From greater carefulness in correcting the sheets of a work in passing through the press, errors in sense or typography are now much more rare than formerly; in many instances, indeed, books are now produced without a single error which needs to be pointed out and corrected. As an example of one, for "errors" read "errors" on first line of this article. On this subject interesting particulars are given in Disraeli's *Curiosities of Literature*, of which the following is a specimen: "Besides the ordinary *errata* which happen in printing a work, others have been purposely committed, that the *errata* may contain what is not permitted to appear in the body of the work. Wherever the inquisition had any power, particularly at Rome, it was not allowed to employ the word *fatum*, or *fata*, in any book. An author, desirous of using the latter word, adroitly invented this scheme: he had printed in his book *facta*, and in the *errata* he put, 'for *facta*, read *fata*.'"

ERRATICS, the name given to the water-worn blocks of stone that have been washed out of the boulder clay, or are still inclosed in it, because they have generally been derived from rocks at a distance. See **BOULDERS** and **BOULDER-CLAY**.

ERRHINES (Gr. *en*, in, and *rhin*, the nose), medicines administered locally to produce sneezing and discharge from the nostrils, in catarrh, and in various disorders of the head and eyes. Common snuff, and other vegetable irritants are so used.

ERROR, PROCEEDINGS IN. In the language of the law, the word error denotes not merely a mistake in the ordinary meaning of the word, but such a misapprehension of the law by the court, or such a deviation from established principles, as to constitute an injury to one party so serious in its nature as to entitle him to carry his case to a court of review. It has been defined as a mistake in a judicial determination of a court to the prejudice of the legal rights of one party; and this mistake may be either in a wrong decision on the merits or in ruling wrongly upon an incidental point involved. The method of obtaining a reversal of the wrong ruling or judgment may be either by appeal or through a *writ of error*. Often the word error is used by abbreviation in place of the expression writ of error, as in saying that a certain judgment may be "reversed on error." A court of review to which application may be made for the righting of the injury caused by the error is often called a court of error. Thus the titles of the highest court of appeals in Connecticut is the Supreme Court of Errors; in New Jersey and Delaware the courts of the same standing are called the Supreme Courts of Errors and Appeals. The writ of error is the precept or process issuing from the court of review to the lower court, pointing out that error has been committed, and requiring the record of the case to be sent up to the higher court for examination. The method of review by writ of error originated in the common-law practice, and corresponded to the appeal in equity practice. Under the common law the error might be either of fact or of law; in the former case the court of original jurisdiction might correct the error, in the latter the matter was taken up by writ to a superior court. In the English courts this method of reviewing the errors of inferior courts is abolished (as is also the bill of exceptions) by the Judicature Acts of 1875; the present method is simply by a motion for a rehearing.

In the United States in some states the original common-law practice has been retained, though usually with modifications, but in many, in civil actions, a direct appeal has been substituted. Under proceedings in error the party who sues out the writ in the appellate court is called the plaintiff in error, the opposing party the defendant in error. The proceeding by a writ of error differs from a motion for a new trial and from a motion in arrest of judgment in that it does not lie until final judgment has been rendered. It may not be obtained for minor or technical defects in the preliminary pleadings, but only for such errors as would be of serious importance on a demurrer or a motion in arrest of judgment; in such cases the writ of error is a matter of right. Formerly a writ of error was not allowed in criminal cases, but under the modern practice it is accepted as a method of reviewing proceedings in such cases after a conviction by a jury. Under the practice of the English courts, and in almost all of the states in this country, an appeal on the merits of the case, such as may be taken in a civil case, does not lie in a criminal action, and instead a writ of error may be resorted to to obtain a reviewing of the proceedings in the court in which the conviction has taken place. Such proceedings in error will lie only for a defect in substance, one which is a part of the record, not for formal defects in the indictment.

ERRORS. In all observations, *E.* must be made. The best instruments have imperfections; and no man, however equable his temperament, can always rely on his making a proper use of his senses. As in astronomy numerical correctness in the results of instrumental measurements is of the first consequence, it is the constant care of the observer to detect and make allowance for errors. The three principal sources from which they may arise are—1st, External or incidental causes, such as fluctuations of weather, which disturb the amount of refraction; changes of temperature, affecting the form and position of instruments, etc.; 2d, *E. of observation*, being such as arise from

inexpertness, defective vision, slowness in seizing the exact instant of an occurrence, atmospheric indistinctness, etc.; and such E. as arise from slips in clamping and momentary derangements of the instrument; 3d, Instrumental defects, owing to E. in workmanship, and such as arise from the instrument not being properly placed—called E. of adjustment. The first two classes of E., so far as they cannot be reduced to known laws, vitiate the results of observations to their full extent; but being accidental, they necessarily sometimes diminish and sometimes increase them. Hence, by taking numerous observations under various circumstances, and by taking the *mean* or *average* of the results obtained, these E. may be made to destroy one another to a great extent, and so far may be subdued. With regard to the third class, it is the peculiarity of astronomical observations to be the ultimate means of detection of all defects of workmanship and adjustment in instruments, which by their minuteness elude every other mode of detection. See sir John Herschel's *Outlines of Astronomy*, s. 138 *et seq.* It may be mentioned, however, that the method of subduing E. of the first two classes by the law of average is not applicable in all cases. In certain cases, recourse must be had to what is known as the method of least squares. See SQUARES, METHOD OF LEAST; see also PROBABILITY.

ERSCH, JOHANN SAMUEL, the founder of German bibliography, was b. at Grossglogau, in Lower Silesia, 23d June, 1766; and exhibited from an early period a decided bias towards that branch of literature in which he afterwards obtained so high a reputation. At Halle, where he was sent to study theology in 1785, he devoted himself to historical investigations. After several vicissitudes, he obtained, in 1800, the office of librarian to the university of Jena. Three years later, he was called to Halle as professor of geography and statistics; and in 1808, was appointed, in addition, principal librarian. He died at Halle, 16th Jan., 1828. E. was long engaged in miscellaneous bibliographical work for other scholars; but in 1818, along with Gruber, commenced the publication at Leipsic of the *Allgemeine Encyclopädie der Wissenschaften und Künste* (Universal Encyclopædia of the Sciences and Arts), a work of immense value. By his *Handbuch der Deutschen Literatur seit der Mitte des 18 Jahrh. bis auf die Neueste Zeit* (Handbook of German Literature from the Middle of the 18th Century to the most recent Time, 4 vols., 1812–14), he first established modern German bibliography in the technical sense of the word; and by its completeness, accuracy, and mode of arrangement, it is undoubtedly fitted to serve as a model for the imitation of other nations.

ERSE (a corruption of *Irish*), the name given by the lowland people of Scotland to the language spoken by the inhabitants of the western highlands, as being of Irish origin. See BRETT'S AND SCOTS. The proper name is Gaelic (q.v.).

ERSEK-UJVAR'. See NEUHAUSEL.

ERSKINE, Rev. EBENEZER, the founder of the secession church in Scotland, was the son of the Rev. Henry Erskine, minister of Chirnside, in Berwickshire, a descendant of the noble family of Mar, and was b. June 22, 1680. He studied at Edinburgh, and after acting for some time as tutor and chaplain in the family of the earl of Rothes, he was licensed to preach the gospel by the presbytery of Kirkcaldy in 1702. His abilities and excellent character soon brought him into notice, and in the following year he was appointed minister of Portmoak in the shire of Kinross. Here he applied himself indefatigably to the study of the Scriptures, and became so deeply convinced that to preach "Christ crucified" was his grand and constant duty as a minister, that after some time the earnestness, unction, and piety which now marked his discourses, became exceedingly attractive to the people accustomed to the chilling "legalism" which then predominated in the Scottish pulpit. E.'s popularity was not confined to the parish of Portmoak; serious Christians from all parts of the country were eager to enjoy occasionally the benefits of his ministry, and on sacramental occasions, he had frequently attendants from the distance of 60 or 70 miles. In 1731, he was translated to Stirling, after having discharged the pastoral office in Portmoak for 28 years. Previous to this event, however, the religious peculiarities of E. had brought him into unpleasant relations with some of his brethren, by the interest which he exhibited in a book called the *Marrow of Modern Divinity*, marked by its strong evangelicalism of doctrine and sentiment. After his transference to Stirling, E. distinguished himself by his advocacy of popular rights in the settlement of ministers; and ultimately involved himself in such antagonism to the church of Scotland, or at least to the ruling party in it of the time, that, along with other three clergymen, he was deposed in 1733. (For an account of the circumstances which led to these depositions, see UNITED PRESBYTERIAN CHURCH). He was shortly after joined by his brother Ralph and several other ministers. They now virtually formed a distinct sect, but they still continued to occupy their parish churches. An effort was made in 1734 to restore them to their legal connection with the church; it was unsuccessful. In 1736, E. and his friends formally seceded, but still it was not till 1740 that they were ejected from their churches. Shortly after this, a furious, and, as it seems to people now-a-days, a contemptible squabble broke out among the seceders in regard to the propriety of taking the burgess-oath. The result was a division of the sect into two bodies, the Burghers and Antiburghers. See

UNITED PRESBYTERIAN CHURCH. E. was the leader of the Burghers. He died June 2, 1754.

ERSKINE, HENRY, 1746-1817; a Scotch lawyer, brother of Thomas, lord Erskine. He was lord advocate of Scotland in 1782 and 1806. In politics he was a whig; but his fame rests chiefly on his wit and tact as an advocate.

ERSKINE, JOHN, of Carnock, and afterwards of Cardross, an eminent Scottish jurist, and professor of Scots law in the university of Edinburgh, was the son of the Hon. John Erskine of Carnock, third son of lord Cardross, whose descendants have now succeeded to the earldom of Buchan. John Erskine, the father, was a man of importance in his day, not only on account of the family to which he belonged, which even then had been prolific in historical characters, but in consequence of his personal qualities and the positions which he held. Having been forced to quit Scotland from his attachment to the Presbyterian religion, he retired to Holland, and became an officer in the service of the prince of Orange. At the revolution, he accompanied William to England, and as a reward for his services, was appointed lieutenant-governor of Stirling castle and lieut.col. of a regiment of foot. John E., the younger, born 1695, became a member of the faculty of advocates in 1719, but did not succeed as a practitioner of the law. On the death of Alexander Bain in 1737, Mr. E. was nominated to succeed him in the chair of Scots law, an office the duties of which he performed with great reputation for 28 years. For many years Mr. E. made use of sir George Mackenzie's (q.v.) *Institutions of the Law of Scotland* as his text-book; but in 1754 he published his well-known *Principles of the Law of Scotland*, which were thenceforth used for that purpose by himself and by his various successors down to the present time. On his retirement from the professorship in 1765, Mr. E. occupied himself in preparing his more important work, *The Institutes of the Laws of Scotland*, but it was not published till 1773, five years after his death. Mr. E. was twice married—first to Miss Melville, of the noble family of Leven and Melville, by whom he left the afterwards celebrated clergyman, John Erskine; and, second, to Ann, second daughter of Stirling of Keir, by whom he had four sons and two daughters. As a legal writer, Mr. E. is inferior to none of the Scottish jurists, with the single exception of lord Stair, who had the benefit of the more learned and wider judicial training of earlier lawyers, who were educated in a continental school. In consequence of the extent to which lands changed hands in Scotland subsequent to the rebellions, feudal conveyancing became the most prominent subject of study amongst the lawyers of Mr. E.'s day, and the principles of commercial law, of which Stair laid the foundation, and which have become so important in our own time, were somewhat thrown into the shade. The labors of Mr. Bell in these departments have again brought the law of Scotland into connection with the general current of European law and mercantile practice throughout the world. But of all those departments which constitute the law of Scotland, as developed by the usages and forms of society in the country itself, there is at the present day no clearer, sounder, or more trustworthy expositor than Mr. Erskine.

ERSKINE, Rev. Dr. JOHN, son of John Erskine, of Carnock, the author of the *Institutes of the Law of Scotland*, was b. June 2, 1721, studied at the university of Edinburgh, and in 1743 was licensed to preach by the presbytery of Dunblane. In the following year, he was ordained minister of Kirkintilloch, where he remained until 1753, when he was presented to the parish of Culross, in the presbytery of Dunfermline. In 1758, he was translated to New Greyfriars church, Edinburgh; in 1766, the university of Edinburgh conferred on him the honorary degree of doctor of divinity; and in 1767, he was promoted to the collegiate charge of Old Greyfriars, where he had for his colleague Dr. Robertson. In the general assembly of the church of Scotland, he was for many years the leader of the popular or evangelical party; and there the openness and integrity of his character secured him the confidence and affection of his friends, and the esteem and respect of his opponents. Between him and Principal Robertson, the leader of the moderate party, there was a courteous and honorable friendship; and the funeral sermon which he preached on the death of his colleague, did equal honor to E.'s head and heart. He died Jan. 19, 1803. E.'s writings are exceedingly numerous. They consist of essays, letters, sermons, dissertations, and pamphlets, etc., mainly of a religious character, and exhibit a superior degree of ability. Sir Walter Scott, in his *Guy Mannering*, gives a graphic and accurate description of his powers as a preacher.

ERSKINE, Rev. RALPH, brother of Ebenezer, was b. at Monilaws, in Northumberland, Mar. 18, 1685, and after completing the usual course of study incumbent on a minister, was ordained to the parish church of Dunfermline in 1711. Sympathizing with the sentiments of his brother Ebenezer, he withdrew from the judicatures of the established church in 1737. In the controversy concerning the Burgess-oath, he also took part with his brother. E. died Nov. 6, 1752. His fame rests chiefly on his *Gospel Sonnets* and other religious works, which were once highly popular.

ERSKINE, THOMAS, Lord ERSKINE, was the youngest son of Henry David, tenth earl of Buchan; and was b. in Edinburgh, 10th Jan., 1750. Although his father, at the period of his birth, was reduced to an income of £200 a year, he transmitted to him the blood of a race which had been prolific in men of great ability, and had been ennobled

before the era of genuine history. The countess, who was the daughter of sir James Stewart, of Goodtrees, in the co. of Midlothian, was not only a godly Presbyterian and a skillful housewife, but a gifted and accomplished woman. After E. had attended for some time the high school of Edinburgh, the family removed to St. Andrews, at the grammar school of which place, and subsequently at the university, though never it would seem as a matriculated student, Thomas E. received the rest of such education as fell to his share. His desire was to study for a profession; but his parents, who had sent his eldest brother, lord Cardross, to Leyden, and were educating his second brother, Henry, afterwards the well-known Harry E., for the Scottish bar, could not afford the expense of a third learned education, and sent him to sea as a midshipman. In this capacity he served for four years, until the death of his father, when he purchased a commission in the first royals, and was for some time stationed at Minorca, where he employed his leisure time in the study of English literature. On his return to London, his birth, his acquirements, the elegance of his manners, and volubility of his conversation, led to his being warmly received in the best circles. It was then that he had the controversy with Dr. Johnson on the respective merits of Fielding and Richardson which Boswell has recorded; and that he published a pamphlet on the prevailing abuses in the army, which, though anonymous, was well known to be his, and obtained a great circulation. E. now grew tired of the army as a profession, in which he saw little chance of promotion; and while in this humor, an accidental interview which he had with lord Mansfield at an assize court, determined him to prosecute the study of law. E. was admitted a student of Lincoln's Inn, 26th April, 1775, and on the 13th Jan., 1776, he entered his name on the books of Trinity college, Cambridge, as a gentleman commoner. Many anecdotes are told of the privations which E. underwent when studying for the bar—how he lived on “cow-heel and tripe,” dressed so shabbily as to be quite remarkable, and boasted that *out of his own family* he did not know a lord. Such stories, though probably exaggerated, proved that he endured considerable privations—considering his rank—in fitting himself for the legal profession. Lord Campbell says, that “during Easter and Trinity terms he excited a great sensation in the dining-hall by appearing with a student's black gown over the scarlet regimentals of the royals; *probably not having a decent suit of plain clothes to put on.*” Though E. was aided by his aristocratic connection, his rise was still very wonderful. Without the advantage of a business training, or what, probably even in those days, was far more important, a business connection, he rose into practice with almost unprecedented rapidity. After his first speech, the attorneys actually flocked round him with their retainers, and in telling the story, he used sometimes to bring the number which he received before quitting Westminster hall up to sixty-five! His two first clients were officers in the navy—capt. Baillie, who held an office in Greenwich hospital, against whom a rule had been obtained calling upon him to show cause why a criminal information for a libel reflecting on lord Sandwich's conduct as governor of the charity, should not be filed upon him; and admiral Keppel, who was tried by a court-martial at Portsmouth for incapacity and misconduct in an encounter with the French fleet off Ushant; and in both cases E. derived benefit from his own early connection with the service and the special information which he thus possessed. Admiral Keppel sent him two £500 notes as a fee. From this time forth, E.'s good fortune as an advocate was uninterrupted. In 1783, he was returned to parliament for Portsmouth. Four years and a half after he was called to the bar, he had cleared £8,000 to £9,000, besides paying his debts, he had got a silk gown, business of at least £3,000 a year, and a seat in parliament, and had made his brother lord advocate. In parliament, on the other hand, he failed so egregiously in his first speech as to leave scarcely any hope in the bosoms of his admirers, and what is very singular, his failure and lord Eldon's took place the same night. To some extent the phenomenon was accounted for by Sheridan's remark when he said to him: “Erskine, you are afraid of Pitt, and that is the flabby part of your character.” But notwithstanding his political mortifications, his professional career went on with increasing brilliancy. In 1786, he was made attorney-general to the prince of Wales, by whom he was warmly patronized, but towards him and every one else he exhibited that manly independence which was the best part of his character. The fact of his appearing as counsel for Thomas Paine is more to his credit, than even the brave and honest speech which he made in his defense; whilst his removal in consequence from his office is, as lord Campbell has said, a lasting disgrace to those from whom the measure proceeded. Throughout the political trials which occurred in this country at that troubled period, he enacted the same manly part. When E. was proposed for the woolsack, an office far beyond his legal attainments, the king, George III., in consenting, exclaimed: “What! what! well! well!—but remember he is your chancellor, not mine.” Yet his decisions as lord-chancellor, according to lord Campbell, are not so much *bad* as *superficial*, though by some equity practitioners they are spoken of as the *apocrypha*. E. was engaged in the defense of queen Caroline. He died 17th Nov., 1823.

ERSKINE, THOMAS, of Linlathen, 1788–1870; a Scotch writer on theology and religion. He was a descendant of the earl of Mar, regent of Scotland under James VI. He studied law at Edinburgh university, and, 1810, became a member of the faculty of

advocates. He retired from the bar in 1816, on succeeding to the family estate after the death of his brother. Erskine's principal works are: *Remarks on the Internal Evidence of the Truth of Revealed Religion*; *Essay on Faith*; *Unconditional Freeness of the Gospel*; *The Brazen Serpent*; *Doctrine of Election*; and other papers.

ERUPTIVE ROCKS. See IGNEOUS ROCKS.

ERYNGO, *Eryngium*, a genus of plants of the natural order *umbelliferae*, having simple umbels, which resemble the heads of composite flowers, a leafy involucre and leafy calyx, and obovate, scaly fruit destitute both of ridges and vittæ. The species are numerous, mostly natives of the warmer temperate parts of the world, with alternate, simple, or divided leaves, which have marginal spines. One species only is common in Britain, the SEA ERYNGO, or SEA HOLLY (*E. maritimum*), which is frequent on sandy sea-shores; a very stiff, rigid, and glaucous plant. *E. campestre* has also been found in England and Ireland, but is very rare. Its root was formerly much employed in some parts of Europe as a tonic. That of *E. maritimum* is used in the same way, and possesses the same properties, being sweet and aromatic. It is sold in a candied state, and was formerly reputed stimulant, restorative, and aphrodisiac. Shakespeare makes Falstaff allude to the snowy color and supposed properties of this now almost disused sweetmeat, for the preparation of which Colchester has long been famous above all other places. E. root has also been used as an aperient and diuretic. Linnæus recommends the blanched shoots of *E. maritimum* as a substitute for asparagus. *E. fetidum*, a native of the warm parts of America, is called fit-weed in the West Indies, a decoction of it being much used as a remedy in hysterical cases. *E. aquaticum*, a native of low wet places in North and South America, is called rattlesnake weed and button snakeroot. The root is diaphoretic and expectorant, and has a spurious reputation as a cure for the bite of a rattlesnake.

ERYSIMUM, a genus of plants of the natural order *cruciferae*, tribe *sisymbriæ*. The pod is four-sided. *E. cheiranthoides*, a branching annual, about 18 in. high, with lanceolate scarcely toothed leaves and small yellow flowers, is found in many parts of Europe, and also in North America. It is not uncommon in waste places and cultivated grounds in Britain, but may perhaps have been originally introduced for its medicinal use. Its seeds were formerly much employed as an anthelmintic, from which it has the name of WORM-SEED. It is also called TREACLE MUSTARD, because it was employed as an ingredient in the famous *Venice treacle*. *E. perfoliatum* is cultivated in Japan for the fixed oil of its seeds. Some of the plants formerly referred to E. are now included in other genera, as *sisymbrium* and *alliaria* (q.v.).

ERYSIPELAS (Gr. derivation uncertain), an inflammatory and febrile disease of the skin, attended by diffused redness and swelling of the part affected, and in the end either by desquamation or by vesication of the cuticle, or scarf-skin, in the milder forms, and by suppuration of the deeper parts in the severer varieties of the disease (phlegmonous erysipelas). E. affects, in a large proportion of instances, the face and head; it is apt to be attended with severe and typhoid fever (see FEVER), and often with great disorder of the nervous system, arising in some instances from inflammation of the membranes of the brain. In other parts of the body, severe or phlegmonous E. is apt to be succeeded by protracted and exhausting suppurations, and sometimes by diseases of the bones, or inflammations of the internal organs. E. is frequently an epidemic (q.v.) disease; it is also very apt to recur in a person who has been attacked once or oftener; and this is especially true of the form which affects the face. It is seldom that depletion is allowable in E., but the bowels should be well cleared out in most cases, and a diuretic (q.v.) given, after which the treatment consists for the most part in watching narrowly the progress of the case, keeping up the strength as well as possible, and obviating special dangers as they occur. In some cases, iron is used as a specific remedy.

ERYTHEMA (Gr. *eruthainō*, I redden), a minor form of erysipelas (q.v.), presenting the same tendency to diffusion and redness, but not so much swelling, and little disposition towards suppuration, or even vesication. E. is chiefly dangerous when it presents itself in a wandering shape, attended with slow consuming fever. The muriated tincture of iron, in doses of twenty drops in water every hour or two, has been regarded as a specific in this disease, as well as in erysipelas. Some forms of E. are distinctly connected with constitutional diseases, as gout, rheumatism, syphilis, etc., and depend for their cure on the removal of the cause.

ERYTHRÆA. See CENTAURY.

ERYTHRÆAN SEA, in ancient geography, a name applied to an indefinite expanse of the Indian ocean, but including the Persian and Arabian gulfs. Later geographers restricted the name Erythræan to the Arabian gulf.

ERYTHRINA. See CORAL FLOWER.

ERYTHRONIUM, a genus of bulbous-rooted plants of the natural order *liliaceæ*, with drooping flowers and the segments of the perianth reflexed. *E. dens canis*, the DOG-TOOTH VIOLET, so called because of the resemblance of its little white bulbs to dogs' teeth, is a well-known ornament of our flower-borders in spring. It is a native of the

central parts of Europe and s. of Siberia. Anthelmintic properties are ascribed to the bulbs. Those of *E. Americanum* are emetic.

ERYTHROPHLÆUM, a genus of trees of the natural order *leguminosæ*, sub-order *mimosæ*. *E. Guineense*, a native of Guinea, is a very large tree, 100 ft. high, remarkable for the great quantity of red juice which every part of it contains, and interesting on account of the employment of this juice by the natives for an ordeal to test the innocence or guilt of a person accused of crime. The juice is swallowed in large draughts, and those who remain uninjured by it are supposed to be innocent.

ERYTHROXYLA'CEÆ, a natural order of exogenous plants, allied to the *malpighiaceæ*. They are trees or shrubs, with alternate simple leaves, stipules, flowers growing from amidst scale-like bracts, calyx of five sepals, corolla of five petals, each petal having a curious appendage—a plaited scale—at the base, 10 stamens united at the base, a three-celled ovary with two cells empty, and the third containing a single ovule, three styles, and the fruit a drupe. Nearly 100 species are known, natives of warm countries, and chiefly of tropical America. To this order belongs the coca (q.v.). The wood of some of the species is bright red; that of *erythroxylon* (Gr. red wood) *suberosum* is used in Brazil for dyeing, and a permanent red is obtained from it. That of *E. hypericifolium* is the *bois d'huile* (oil-wood) of Mauritius.

ERYTREA. See ERITREA.

ERYX, an ancient city and mountain in the w. part of Sicily near the sea-shore. There was once a temple to Venus on the mountain. Eryx was taken and retaken in the Carthaginian wars, and was partially destroyed by Hamilcar. The site of the old city is now occupied by a convent, and the mountain by a Moorish castle, used as a prison, around which is the modern town of San Giuliano.

ERZBERG. See EISENERZ.

ERZERUM' or **ERZROUM**, a province embracing a large portion of Turkish Armenia, bordering on Russia and Persia, between 39° and 41° n. and 39° and 44° e.; pop. 1885, 645,702. It is mainly a high table-land, and is traversed by several mountain ranges, between which are fertile valleys. The chief rivers are the Aras, or Araxes, the Euphrates, and the Kur. Chief town, Erzerum.

ERZERUM', or **ERZROUM'**, properly *Erserum*, a strongly fortified t. in Turkish Armenia, in lat. 39° 55' n., and long. 41° 20' e., not far from the northern source of the Euphrates. It is situated in a high, but tolerably well cultivated plain; its site being 6,200 ft. above the level of the sea. The climate is cold in winter; and dry in summer. E. is the residence of an English, a Russian, and a French consul; and its pop. is estimated at 60,000, of whom the majority are Mohammedans, but there are many Christians, for the most part Armenians, who carry on a brisk trade, and have thus attained to a degree of prosperity unusual in the east. The copper and iron wares of E. have acquired a wide celebrity. Situated at the junction of the important highways leading from Trebizond, Transcaucasia, Persia, Kurdistan, Mesopotamia, and Anatolia, E. forms an entrepôt of commerce between Europe on the one hand, and the interior of Asia, and particularly Persia, on the other. The streets, the houses of which are built chiefly of volcanic stone cemented with mud, are narrow, crooked, and filthy; and ruins of fortifications and of buildings formerly magnificent, everywhere meet the eye. The town consists of the fortress, strictly so called, and four suburbs. The fortress, which is inclosed by a high wall, has, on the w., a citadel called Ijkaleh, with many curious monuments, and a mosque of Christian origin. The fortress also contains the residence of the chief magistrate, some caravanseries, and a few elegant houses belonging to the higher order of officials and Mohammedan merchants. The suburbs boast numerous mosques, several Armenian churches, and a number of large bazars and caravanseries. E. imports shawls, silk goods, cotton, tobacco, rice, indigo, etc.; and exports corn, sheep, and cattle, horses, mules, and gall-nuts. The principal trades carried on are tanning, dyeing morocco, and blacksmiths' and coppersmiths' work. It is the seat of an Armenian bishop, and of Protestant and catholic missions. E. is a very ancient town. Its Armenian name was *Garin Khalakh*. Near it stood the old Syro-Armenian town of Arsen. When the Seljuks captured this place the inhabitants fled to a fortress at E., which the Seljuks accordingly called *Arsen-er-Rum*, i.e., Arsen of the Romans (or Byzantines), whence the modern Erzerum. In 1201, it fell into the hands of the Seljuks; of the Mongols in 1242; and finally, in 1517, into those of the Turks. It still, however, continued to be the most important city in the country, and at the commencement of the 19th c. had a pop. of 100,000 inhabitants. In the war of 1829, between the Turks and Russians, the taking of E. by the latter decided the campaign in Asia. E. was an important military center during the war of 1877-78, and much hard fighting was done in its neighborhood. In Dec., 1877, the Russians closed round the city, already hard pressed, and reduced its defenders to the utmost distress: in Feb., 1878, it was surrendered to Russia. The Russians held it till Oct., 1878, when it was given up to the Turks.

ERZGEBIRGE ("Ore Mountains"), the name given to the chain of mountains, rich in metals, stretching in a south-westerly direction, on the confines of Saxony and Bohemia, from the valley of the Elbe to the Fichtelgebirge, in long. 12° 20' e. In the

s., it rises to a height of from 2,000 to 2,500 ft., forming a steep wall of rock; in the west, it forms broad, slaty plateaus, and gradually slopes down towards the Saxon side to the level districts of Altenburg and Leipsic. In consequence of this formation, the streams flowing southward are small, while the n. side of the chain, which is well wooded, presents a series of romantic, and occasionally fertile and thickly peopled valleys, watered by the Mulde, the Pleisse, and their numerous tributaries. The town of Gottesgabe, the site of which is the highest in Germany, is situated towards the s. of the E. range, in long. 12° 54' e., at an elevation or 3,162 feet. The Keilberg, the highest point of the range, is 3,802 ft. above the level of the sea.

ESAIAS. See **ISAIAH**.

ESARHAD DON was the son of Sennacherib, king of Assyria. Nothing is known, positively, concerning him until his accession to the throne after the murder of his father by two other sons. The length of his reign cannot be determined, but the number of his military expeditions and the extent of his architectural works show that it must have continued many years. The order in which its principal events occurred is not known. He reigned personally at Babylon as well as Nineveh, having palaces at both cities and residing alternately in each. This fact explains and justifies the Scripture statement that Manasseh, king of Judah, when taken captive, was brought before the king of Assyria at Babylon. The monuments indicate that E. was one of the mightiest of the Assyrian kings. He conquered all Asia between the Persian gulf, the Armenian mountains, and the Mediterranean sea. On the w., his influence extended over Cilicia and Cyprus; on the e., he made war against tribes which his fathers had not known; and on the s., asserted authority over Egypt and Ethiopia. He built numerous temples that shone with silver and gold, and palaces that surpassed in magnificence those of his predecessors. The s.w. palace at Nimrud, built by him, was of extraordinary size, its great hall being 220 ft. by 100, and its porch 160 ft. by 60. It was adorned with the usual array of winged bulls, colossal sphinxes, and sculptured slabs of alabaster. When first uncovered it was apparently in a good state of preservation, but it was soon evident that fire had raged through it, splitting and calcining the alabaster slabs, which consequently crumbled to dust when exposed to the air. In his unfinished palace at Calah the slabs around the rooms were smoothed in readiness for the inscription, but when they were turned, in order to be carried away, their backs were found to be sculptured, showing that they had been taken from an older building, and that E., having consigned to oblivion the records of a former reign, was preparing to celebrate his own exploits on the reversed sides of the slabs.

E' SAU ("hairy" or "rough"), the eldest son of Isaac, and twin-brother of Jacob. As E. grew up, he became "a man of the field," a cunning hunter, and his father's favorite. He seems to have been a wild, rough, hearty Bedouin, or son of the desert, thinking nothing of to-morrow, but living with joyous carelessness from day to day. This is apparent from the manner in which he allowed Jacob to defraud him of his birthright, although it carried with it, besides many temporal advantages, the *Covenant-blessing* itself. After this transaction, E., when 40 years of age, married two Canaanitish women, "which were a grief of mind unto Isaac and to Rebekah" (Gen. xxvi. 35). Then follows the narrative of Jacob's personation of his brother, and his securing irrevocably the blessing to himself. E. now swore to kill his brother, whereupon Rebekah sent Jacob to his uncle Laban in Padanaram. E. next married his cousin Mahalath, the daughter of Ishmael; and appears to have established himself in his wife's country, to the s. of Palestine, in Mt. Seir. Here he lived probably as a predatory chief. When Jacob was returning from Padanaram, E. encountered him with 400 of his Bedouins. The meeting was a touching one. The wild borderer at least was in earnest. "Esau ran to meet him, and embraced him, and fell on his neck, and kissed him" (Gen. xxxiii. 4). His anger had long died out. E. next appears at the burial of his father Isaac, whom he seems to have loved with the warm and simple affection of a child of nature, and having obtained his share of the property, "went into the country from the face of his brother Jacob" (Gen. xxxvi. 6). From E. the region of Mt. Seir took the name of Edom (q.v.), and his posterity are generally called Edomites.

ESCALADE (Fr. from Lat. *scala*, a ladder), in siege operations, is a mode of gaining admission within the enemy's works. It consists in advancing over the glacis and covert-way; descending, if necessary, into the ditch by means of ladders; and ascending to the parapet of the curtain and bastions by the same ladders differently placed. The ladders are either procured on the spot, or are sent out with the siege-army. A convenient form is in pieces of 12 ft. length, fitting end to end by means of sockets. A firing-party is usually told off, to keep down the fire of the enemy upon the escaladers, especially a flank fire lengthwise of the ditch, which might sweep them off with terrible rapidity. The leaders of an E. constitute a "forlorn hope."

ESCALOP-SHELLS are often used in heraldry to signify that the bearer has made many long voyages by sea. As the Pilgrim's (q.v.) emblem, they were commonly given to those who had been to the crusades; they came to be regarded as indicating either that the bearer or his ancestor had been a crusader. The escalop-shell was the emblem of

St. James the Great, and is generally met with in churches dedicated to him. The more ordinary form of the name is scallop-shell. See PECTEN.

ESCAMBIA, a co. in s. Alabama, on the Florida border, intersected by Escambia and Conecuh rivers, and the Louisville and Nashville railroad; 972 sq. m.; pop. '90, 8666, includ. colored. The soil is level and sandy, and not very productive. Co. seat, Brewton.

ESCAMBIA, a co. in w. Florida, on the Gulf of Mexico, between the Escambia and Perdido rivers, intersected by the Pensacola and Perdido and the Louisville and Nashville railroads; 680 sq. m.; pop. '90, 20,188. It has a level, sandy soil, to a large extent covered with pine forests. Co. seat, Pensacola.

ESCAPEMENT is the term applied to that part of the machinery of a watch or clock by which the onward revolving motion produced by the moving power, whether weights or spring, is brought into contact with the regulating movement of the pendulum or balance-wheel. See HOROLOGY.

ESCAPE WARRANT is a warrant issued in England for the apprehension of persons who have escaped from the queen's bench or fleet prisons. This power is conferred by 1 Anne, s. 2, c. 6, followed by 5 Anne, c. 9. The warrant may be issued by any judge of the court wherein the action was tried, or judgment and execution obtained, upon oath in writing, of the escape of the party, made before himself, or before one of the commissioners to take oaths. The apprehension may be effected on Sunday. The person apprehended is committed to the charge of the sheriff of the county, who is made responsible for his safe keeping.

ESCARP, in fortification, is the side or slope of the ditch next the rampart, and of the parapet itself. When the ditch of a fortress is dry, the E. is usually faced with mason-work, to render it difficult of ascent; and behind this facing (*revêtement*) there are often passages or casemates for defense. In temporary fortifications, the *revêtement* is sometimes of wood; and in field-works, palisades at the foot, or fraises on the *berme* or edge of the ditch, are held sufficient. The E. is always made at as large an angle as the nature of the soil will allow; the design being to offer the greatest possible obstacle to an assailant. See *illus.*, FORTIFICATION, vol. VI.

ESCARS are large heaps of gravel, consisting chiefly of carboniferous limestone, that were accumulated during the pleistocene period. They occur in central Ireland, but are identical with the *ösar* of Sweden; and under the name of *kames*, they are not unknown in Scotland. The gravel is often heaped into narrow ridges 40 to 80 ft. high, and from 1 to 20 m. long.

ESCAUT. See SCHELDT.

ESCHAR (Gr. *eschara*), a slough or portion of dead or disorganized tissue. The name is commonly applied to artificial sloughs produced by the application of caustics (q. v.).

ESCHAROTIC (Gr.), causing an eschar. See CAUSTIC.

ESCHATOL'OGY, the doctrine concerning the last things, in the Christian system, treats of the millennium, the future coming of Christ, the state of man after death, the resurrection, last judgment, and final condition of mankind.

I. *The Millennium and the Future Coming of Christ*.—The xxth chapter of Revelation speaks of a period of a thousand years during which Satan shall be bound in the bottomless pit, and the souls of them who had been beheaded for the witness of Jesus and for the word of God, and who had not worshiped the beast or his image, and had not received his mark upon them, shall live and reign with Christ. This is called the first resurrection. Many persons, uniting this passage with others and professing to interpret them literally, teach that the millennium will be preceded by the second coming of Christ in visible glory, and by the resurrection of the glorified saints to reign with him on earth. Their opinion on this important point naturally colors their interpretation of a large portion of Scripture and of their practical duties as Christians. Many of them are very earnest and confident in the maintenance of their views. In opposition to them the usual faith of Christians has been that the millennium will precede the visible coming of Christ,* and will be accomplished through the divine blessing, given in copious measures, on the diligent use of such means of grace as the church has always employed. They who adopt this view regard the passage in the Revelation concerning the first resurrection as figurative (as the rest of the book manifestly is), and the coming of Christ, promised in the New Testament, as: 1. An exhibition of his providential government over the history of the world and of the church. In this sense the destruction of Jerusalem by the Romans, followed by the dispersion of the Jews, Matt. xxiv. 4-28, and the establishment of the kingdom of Christ, with the gathering of his elect, 29-44, were foretold by him as a coming of the Son of Man. 2. His spiritual presence with his people during their lives and work on the earth, and at the time of their death, Matt. xviii. 20 John xiv. 23, 3. 3. His glorious appearing to judge the world, Matt. xxv. 31; I. Thes. iv. 16.

II. *The State of Man after Death*.—1. Materialists, who assert that the soul is only a function of the body say, consistently enough, that at death both perish together. 2. Pantheists, who maintain that man is a transient form of God's existence, teach that the soul has no consciousness after death. The race is immortal, but the individual

man is not. Flowers bloom from generation to generation, but each flower blooms but once, and after that exists no more. 3. Some, who are neither materialists nor pantheists, suppose that the soul cannot act or manifest itself without a bodily organism, material or other, and that consequently at death it must either cease its activity, or be furnished at once with a new body. The latter part of the alternative many of the class referred to do not hesitate to accept. "Do the dead cease to exist?" they ask, and quickly reply, "No; for there is the spiritual body as well as a natural body; at death the latter is dissolved, but the former is not affected; therefore the life of the soul, still clothed upon, remains unharmed." Those who reject this theory deny that the soul is dependent on matter for the exercise of its faculties, or for its personality, or its susceptibility. Certainly God, who is purely a spirit, is not thus dependent: and as men have a spiritual nature like that of God, the theory cannot be true concerning them. To this it is rejoined that the theory of a "spiritual body" does not require that it be any form of *matter*. 4. Many who reject or disregard the Bible, while they do not deny that the soul continues to exist after death, say they have no proof that it does. Some of this class when dying have declared that they were taking a leap in the dark. 5. The Scriptures teach the continued existence of the soul after death. The Pentateuch teaches it when it calls God the God of Abraham, Isaac, and Jacob after their death, thus implying that they still lived. The Psalms teach it when they speak of the soul as redeemed from the power of the grave, and as being satisfied when it awakes in God's likeness. The prophets teach it when they declare that the dead shall live, that they shall awake and shine as the stars forever and ever. The New Testament teaches it by the promises of Christ, "I give unto them eternal life and they shall never perish;" and by the affirmation of the apostles that Christ hath abolished death and brought life and immortality to light. 6. All who believe in a future resurrection and final judgment necessarily believe in an intermediate state of the soul after death, in some respects different both from its former condition in this life and from its final condition in the life to come. The question is, What is the nature of this intermediate state? (1) Some suppose that between death and the resurrection the soul continues in an unconscious state. Since the Bible speaks of death as a sleep, and since a dead body is as incapable of sleep as a stone, it must be (they think) the soul that sleeps. To this a sufficient answer is that in death the outward appearance of the body is exceedingly like sleep, and that it is for this reason death is compared to it; just as, on the other hand, the actual sleep of a living person has been called the "counterfeit of death." (2) The Roman Catholic church teaches that all who, dying in the peace of the church, are not perfect, pass into purgatory, concerning which they say that it is a state of suffering designed for both expiation and purification; that the duration and severity of the suffering are proportioned to the sinfulness of the sufferers; that the duration may be shortened and the severity alleviated by the prayers of the saints and the sacrifice of the mass; and that it is the prerogative of the church to remit, entirely or in part, the penalty of sins under which the soul suffers. This doctrine was not held, in its completeness, even by Roman Catholics until a comparatively late period. "Purgatory as a burning away of sins," said Dollinger at the Bonn conference of Old Catholics in 1875, "was an idea unknown, in the east as well as the west, until Gregory the Great introduced it. What was thought was that after death those who were not ready for heaven were kept for some time in a state of preparation, and that the prayers of the living were an advantage to them. Gregory the Great added the idea of a tormenting fire. This the schoolmen gradually converted into doctrine which they associated with papal indulgence, till it came to apply to the dead generally, which of course made all seek for indulgence. It went on to have degrees (some could receive indulgence for a few of their sins, others for all), so that eventually the pope, having already the keeping of heaven and the dominion on earth, obtained also sovereignty under the earth." (3) The general faith of Protestants is not uniform on this point; probably the prevalent view is "that the souls of believers are at their death made perfect in holiness, and do immediately pass into glory." According to this view the intermediate state of believers is one of perfect freedom from sin and suffering, and of great exaltation and blessedness. This is not inconsistent with believing that after the second coming of Christ and the resurrection the soul will be still more exalted and blessed. And with it may be mentioned, as not altogether contrary to it, the opinion of many, in both ancient and modern times, that "sheol" and "hades" are general terms for the intermediate dwelling-places of the dead, one division of which is "paradise," the happy abode of the saved; and the other "gehenna," the wretched abode of the lost.

III. *The Resurrection.*—Faith in the resurrection of the body, as additional to the future life of the spirit, rests on revelation. Swedenborgians (and some others in part agree with them) hold that man in this life has two bodies, one external and material, which dies and is buried, never to rise again; the other internal and psychical, which, incapable of death, passes in union with the soul into the invisible world as its spiritual body: the resurrection, therefore, in their view occurs at the moment of death. The Scriptures, in their obvious sense, plainly teach an actual resurrection of the dead. "All that are in the graves shall come forth." "That which is sown a natural body shall be raised a spiritual body." "The corruptible must put on incorruption, and the

mortal immortality." In some true and noble sense, the body raised will be personally representative of that deposited in the grave; for St. Paul, denying the identity of the two—"thou sowest not the body that shall be," and declaring the divine mystery—"God giveth to the seed a body as it hath pleased him," asserts the reciprocal pertinence of the two, each to each—"and to every seed his own body." Zoologists teach that with every living germ there is an immaterial principle by which one species is distinguished from another. In like manner, some suppose that as the soul is created to be incarnate, it is endowed with forces to that end; that, besides its rational, voluntary, and moral faculties, it has what may be called a vital force, which secures the formation of a body suited to its necessities and sphere. Concerning the nature of the spiritual body, nothing can now be known except what Scripture has revealed. From this source we learn that it will be an organism not of flesh and blood, but specially suited to the new state of being in which man is to live and act. Yet it is probable that it will be the glorified likeness of the human form as it existed in this life—the ideal human organism actualized.

IV. *The Final Judgment.*—The consciences of men affirm that God as the judge of all the earth must do right, and also that his moral government, as administered in this present world, does not fully render unto all according to their character and desert: "There are just men unto whom it happeneth according to the work of the wicked; and there are wicked men unto whom it happeneth according to the work of the righteous." Consequently, reason, even among the heathen, calls for a settlement of the destinies of men, so that the justice of God may be vindicated. The Scriptures declare that a final settlement will be made: "God shall bring every work into judgment, with every secret thing, whether it be good or whether it be evil." This judgment is represented as a definite future event, in which the destiny of men and of angels will be determined and manifested: "God hath appointed a day in which he will judge the world in righteousness." The word "day," while not to be taken literally, implies, it is claimed, a definite and limited period. Christ, as God manifest in human personality, and as having made atonement for the sins of mankind, will be the judge: "The Father hath given him authority to execute judgment also because he is the Son of Man." The ground of judgment will be the deeds done in the body; and the character and life of each man will be judged according to the light that he had, and (if he knew the gospel) according to the relation (determined by his own choice) which he sustains to Christ: "He that heareth my word and believeth on him that sent me hath everlasting life, and shall not come into condemnation; but is passed from death unto life."

V. *The End of the World.*—The Scriptures teach that the existing heaven and earth are to be replaced by a new creation: "They shall wax old as a garment, and be changed." "The heavens shall pass away with a great noise, and the elements shall melt with fervent heat; the earth also and the works that are therein shall be burned up. Nevertheless, we, according to his promise, look for a new heavens and a new earth wherein dwelleth righteousness." "I saw a new heaven and a new earth; for the first heaven and the first earth were passed away, and there was no more sea." 2. In the Scriptures, the abode of the saved is sometimes called the better country, even the heavenly; sometimes "the city which hath the foundations;" and sometimes a "house not made with hands," as when the Savior said, "In my Father's house are many mansions, I go to prepare a place for you." 3. The blessedness of the heavenly state may be conceived of as arising, in part, from the vision of God in his glory as seen in the Lord Jesus, from the experience of his love, from the enlargement and glorification of the mental faculties, from the absence of sin and sorrow, from intercourse and fellowship with the holy and happy society of heaven, and from the possession of all good. 4. The wretchedness of the lost—of which, as to its nature or modes, little appears in the Bible, while its certainty and reality are abundantly declared—is conceived of as consisting, partly, in eternal separation from the society and influence of the good, and from fellowship with God's glory, blessedness, and love; in the presence and influence of ungodly and wicked beings; in remorse of conscience and in the power of sin in the soul. Some claim scriptural authority for conceiving of it as consisting in the ultimate and utter extinction of the personal being, sinking under sin. 5. The blessedness of the saved and the wretchedness of the lost appear in the Scriptures as without end. After much debate as to exegesis of the texts involved, the drift of the most recent critical scholarship may be said to be unmistakably towards this decision—that while the Greek language did not possess, as the Greek thought did not require, terms which necessarily carried the meaning of absolute eternity, as we now employ that word (e.g., in reference to the being of God), Christ and his apostles used, in reference to future reward and retribution, such words expressive of unlimited duration as were furnished by the language of their time; and that the whole manner and bearing of their speech on this point seems to intend an avoidance of any suggestion of an end. Especially in regard to retribution, the fact is recognized that the most decisive utterances concerning it are not from the apostles, but from Christ himself, who as the "light of the world," and the professed Savior of men, would have been quick to supply the hope of limited duration, had any such hope been within his thought. There is, however, to be noted a tendency towards statements on this point far less sweeping and dogmatic than were

formerly advanced, and a distinct enlargement of the bounds of admitted variations of belief concerning it among the denominations called evangelical. See IMMORTALITY.

ESCHEAT (Fr. *échoir*, from Lat. *cadere*, to fall out or happen). An incident of feudal tenure of real property, whereby the course of descent from the vassal or tenant as ancestor to an heir became obstructed, and the property fell back or reverted to his immediate lord. In order to complete his title acquired by escheat, it was necessary that the lord should perform some act, such as entering and taking possession of the land or bringing an action at law for its recovery. The principle or theory, upon which he thus recovered the property, was that, since none but those who were of the blood of the person last seized could inherit, and there were no persons of that blood in being and capable of inheriting, the land must result back to the lord of the fee, by or through whom it was given. According to the law of England, escheat was either *propter defectum sanguinis*—i.e., because there were no heirs of the deceased tenant, or *propter delictum tenentis*—i.e., because the blood of the tenant was *attainted* or corrupted, so that those who were related to him as heirs could not inherit. Such corruption of blood occurred when the tenant was convicted of treason or felony. The rule applied to all felonies, and frequently produced much hardship. This form of escheat was peculiar to English law. It is to be carefully distinguished from forfeiture of lands to the crown for treason or felony, which has prevailed in other countries besides England. When this latter penalty was enforced for the crime of treason, the offender forfeited all his lands absolutely to the crown; when it was enforced for any other felony, the forfeiture to the crown was of all the offender's estates for life absolutely, and of all his estates in fee simple for a year and a day, after which they escheated to his immediate lord. (See FORFEITURE.) In English law, escheat as a result of conviction of crime is now abrogated; and all forfeiture for crime, except in cases of outlawry, is abolished. (Statute 33 and 34 Vict. ch. 23.) It is provided, by the Constitution of the United States, that "Congress shall have power to declare the punishment of treason; but no attainder of treason shall work corruption of blood, or forfeiture, except during the life of the person attainted." (Art. 3, § 3.) This indicates the policy which has moulded the laws of the various states, so that escheat as the result of crime is practically unknown in this country.

Since the feudal system has no existence, even in theory, in the United States, escheat, in its technical sense as in force in England, does not and cannot exist here. But by virtue of statutory provisions, generally found in the state constitutions, the title to the property of one who dies without heirs, is transferred to the state in which it is situated; and this transfer is still denominated an escheat. In some states the common law, which precluded aliens from inheriting real property, is still operative. But in many states such disability of alienage has been removed by statute, and the real estate of decedents does not escheat because their only relatives are aliens. It is the general rule that a proceeding known as "inquest of office" must be instituted in behalf of the state, in order to vest in it the title to a decedent's realty. But this is not required in some of the states.

ESCHELLES, LES, a village in Savoy (formerly a Sardinian, now a French state), is situated on the Guier, 12 m. s.w. of Chambéry. The valley beyond this village and on the road to Chambéry is blocked up by a huge limestone rock 800 ft. high, over which travelers formerly used to climb by means of ladders, and hence the name given to this village. Through this mass of limestone the public road now passes by means of a tunnel, which is 25 ft. high, of equal width, and 1000 ft. long. The tunnel was projected and commenced by Napoleon I., and finished in 1817 by the king of Sardinia.

ESCHENBACH, WOLFRAM VON, a celebrated poet of the middle ages, was b. in the second half of the 12th c., of a noble family, which derived its name from the village of Eschenbach near Ansbach. He received the honor of knighthood at Henneberg, and passed his life in knightly fashion. In 1204, he came to the court of Hermann, landgraf of Thuringia, where he shone among the poets of the time, at the so-called Wartburg-war (a rivalry of the German minstrels held at Wartburg in 1206 or 1207). Hermann's successor, Ludwig the pious, appears to have shown E. little favor, in consequence of which he withdrew from the Thuringian court towards the close of his life. He died some time between 1219 and 1225, and was buried in his native village. E.'s poems are partly original, and partly fashioned after French and Provençal models. His rich fancy, deep sentiment, and vivid power of representation, as well as his elegant mastery of language and versification, give something of an epic character to his works, the principal of which are *Parival*, composed before 1212, *Wilhelm von Orange*, and *Titurel*. Besides these, we have several love-songs of his. E. exercised an important influence on his time, but subsequently was almost forgotten; and it is only recently that he has been restored to his place of honor. The first critical edition of his works was that by Lachmann (Berl. 1833). They were translated into modern German by San-Marte (3 vols., Magdeb. 1836-41), and with greater accuracy, though with too slavish literalness, by Simrock (2 vols., Stuttg. 1842).

ESCHENMAYER, KARL ADOLF AUGUST VON, 1768-1852; b. Würtemberg; teacher of practical philosophy at the university in Tübingen, 1818-36; author of many works on philosophy, some of which were directed against the theories of Hegel and against the *Life of Jesus*, by Strauss. He carried a strong tendency to mysticism into his physical researches, and took a deep interest in the phenomena of animal magnetism, becoming at last a devout believer in demoniacal and spiritual possession.

ESCHER, JOH. HEINR. ALFRED, a distinguished Swiss statesman, was b. at Zurich, 20th Feb., 1819, and studied at Bonn and Berlin. In 1842, he was created doctor of law at Zurich; and spent the two following years in Paris, devoting his attention chiefly to studies connected with Roman law. On his return to Zurich, E. became a lecturer in the high school, the subject of his lectures being chiefly the political law of the Swiss confederacy. In 1844, he was elected member of the great council of the canton, and was thus drawn into the arena of practical statesmanship. Even at that early period, his sentiments were decidedly liberal. In Jan., 1845, along with six others who shared his opinions, he published the famous summons to the popular assembly in Unterstrass for the expulsion of the Jesuits. His election into the council of the interior in 1845, and into the council of education in 1846, opened a wide field for his administrative talents in his native canton. The reorganization of the schools in the canton of Zurich, according to the demands of the time, is chiefly his work. In Dec., 1847, he became president of the great council; and in his opening speech, recommended the complete reform of the confederacy, and the greatest possible centralization. In 1848, he was sent as a deputy to the federal diet; and, along with M. Münzinger, was charged with the negotiations entered into between Switzerland and Austria, in regard to the canton of Tessin. In Dec. of the same year, E. became president of the newly elected council of regency. Since that time, his energies have been chiefly directed to education, the reorganization of church policy, and the promotion of railway enterprise and banking institutions in Switzerland. He became president of the national council in 1849, and held the post of vice-president in 1856-57, and 1861-62. He died 1882.

ESCHOLTZ BAY, a portion of the Arctic ocean in Alaska, Ter., forms the innermost part of Kotzebue sound, the first great inlet to the n.e. of Behring's strait. It is about long. 161° w., being barely on the outside of the polar circle. It is worthy of notice chiefly on account of its fossil remains, which, though common on the northern coast of Siberia, are comparatively rare on that of the new continent.

ESCHSCHOLTZIA, a genus of plants of the natural order *papaveraceæ*, of which *E. Californica*, and other species, natives of California, have now become very common in our flower-gardens, making a showy appearance with their large deep yellow flowers. The genus is remarkable for the calyx, which separates from the dilated apex of the flower-stalk, being thrown off by the expanding flower, and much resembling in its form the extinguisher of a candle.

ESCHWEGE, a t. of Prussia, in the province of Hesse-Nassau, is situated on the left bank of the Werra, 25 m. e.s.e. of Cassel. It consists of an old and new town, and a suburb; is surrounded with walls pierced by six gates; and is well built. The only building of note is the castle, which was long the residence of the landgrafs of Hessen-Rotenberg. E. has manufactures of woolen and linen fabrics, etc., also some trade in fruit and victuals. Pop. '90, 9776.

ESCHWEILER, a t. of Rhenish Prussia, in the circle of Aachen, and 9 m. e.n.e. from the city of Aachen (Aix-la-Chapelle), is a station on the railway between Aix-la-Chapelle and Cologne, and stands at the confluence of the Inde and Dente. It has extensive manufactures of ribbons, woollens, canvas, needles, iron-wire, and machinery, also of wax-cloth, lace, glass, vitriol, and vinegar. In the vicinity are mines of zinc and lead. Pop. of commune '90, 18,119.

ESCOBAR Y MENDOZA, ANTONIO, 1589-1669; a Spanish casuist descended from the illustrious house of Mendoza; educated by the Jesuits and a member of the order. He was a preacher for 50 years, delivering sometimes two sermons in a day. His principal works were on casuistry and on Scriptural commentary. His casuistry was severely criticised in the *Provincial Letters* of Pascal, and ridiculed by Boileau, Molière, and La Fontaine, and the name Escobar became a synonym in France for extreme laxity in moral principle.

ESCORT. See CONVOY.

ESCU DO DE VERA GUA denotes at once a river and an island on the Atlantic side of Central America—the latter being at the mouth of the former. They are situated a little to the e. of the boundary between New Granada and Costa Rica. The island is in lat. 9° n., and long. 81° 30' w.; and the river, being only 15 m. long, derives its importance, if any, from the narrowness of the belt which here separates the two oceans.

ESCURIAL (the correct title is EL REAL SITIO DE SAN LORENZO EL REAL DE ESCORIAL), a famous monastery of New Castile, in the province of Madrid, and situated 30 m. n.w. of the town of that name. This solitary pile of granite has been called the eighth wonder of the world, and at the time of its erection surpassed every building of the kind in size and magnificence. It owes its origin (at least, so it is said) to an inspired vow made by Philip II. during the battle of St. Quentin. On that occasion, he implored the aid of St. Lorenzo, on whose day, 10th Aug., 1557, the battle was fought; and vowed that, should victory be granted to him, he would dedicate a monastery to the saint. The E. is built in the form of a gridiron, in allusion to the instrument of St. Lorenzo's martyrdom, and forms a huge rectangular parallelogram 744 ft. from n. to s., and 580 ft. from e. to w., and divided into long courts, which indicate the interstices of the bars. Towers at each angle of this parallelogram represent the feet of the

gridiron, which is supposed to be lying upside down; and from the center of one of the sides, a range of building abuts, forming the royal residence, and representing the handle. The E. was begun in 1563, and finished in 1584, and was intended to serve as a palace, mausoleum, and monastery. It has a splendid chapel with three naves, 320 ft. long, and 320 in height to the top of the cupola. The *pantheon*, or royal tomb, is a magnificently decorated octagon chamber, 36 ft. in diameter by 38 ft. high, in the eight sides of which there are numerous black marble sarcophagi. Kings only and the mothers of kings are buried here. The E. is an immense building; it is stated that it has 14,000 doors and 11,000 windows, and its cost was 6,000,000 ducats. Its library, previous to the sack of the E. by the French in 1808, contained 30,000 printed and 4,300 MS. volumes, mainly treasures of Arabic literature, of which a catalogue, but not a good one, was drawn up by Casiri in his *Bibliotheca Arabico-Hispanica* (2 vols., Madrid, 1760-70). They were, however, at that time removed to Madrid; and on being sent back to the E., it was discovered that the library consisted only of about 20,000 volumes—a third of the whole having been lost. The French also plundered the place of its valuable collection of coins, medals, and pictures. On Oct. 2, 1872, the E. was struck by lightning, and partially burned. The E. is saved from going to ruin by grants of public money, which are occasionally made.

ESCUTCHEON, in heraldry, is synonymous with shield (q. v.).

ESCUTCHEON OF PRETENSE, or **INESCUTCHEON**, is a small shield placed in the center of the larger one, and covering a portion of the charges on the latter, in which a man carries the arms of his wife when she is the heiress of her family. It is said to be carried *surtout*, or over-all. Sometimes also a shield over-all is given as a reward of honor; thus, the earl of Stirling did bear two coats quarterly, and over all an inescutcheon of Nova Scotia, because he was the first planter of it.—*Mackenzie, Heraldry*, p. 82.

ESDRAË'LOH, a great plain in Palestine, separating the mountain ranges of Galilee from those of Samaria. It forms a triangle between Nazareth in the n., a pass opening toward Akka in the w., and Jenin, the ancient Eugeanium, in the south. The watershed extending from Nazareth to Jenin, about 15 m., may be considered the base of the triangle, and divides the lands drained by the Jordan from those watered by the Kishon. The Galilean hills, forming the n. boundary of the plain, extend from Nazareth w. 12 m., and there draw near the Carmel range, forming a narrow pass by which the Kishon finds egress toward the sea. The Carmel, or Samaria, range extends from this pass s. e. 18 m. to Jenin. The e. boundary rises at times into high hills, the most important of which is Mt. Gilboa. The plain is sometimes called the valley of Jezreel. This plain of E. has in all history been a battle-field. It was the scene of important battles between the Israelites and their enemies, among them the triumph of Barak and the defeat of Saul and Josiah. Here the Egyptians and the Assyrian hosts met in repeated struggles, and in later times it appears in the wars of Napoleon. In the sublime imagery of the book of the Revelation, this plain appears as the scene of the last great struggle between the powers of good and evil.

ESDRAS, BOOKS OF. The word *Esdra*s is the Greek form of Ezra, and indicates that the books so named do not exist in Hebrew or Chaldee. In the Vulgate, the first book of Esdras means the canonical book of Ezra; and the second, the canonical book of Nehemiah; whilst the third and fourth are what we call the first and second books of Esdras. But in the Vatican and other editions of the LXX., what we call the first book of Esdras comes first, and is followed by the canonical book of Ezra, which is termed the *second* book of Esdras. In all the earlier editions of the English Bible the order of the Vulgate is followed. The Geneva Bible was the first to adopt the classification now used, according to which Ezra and Nehemiah give their names to two canonical books, and the two apocryphal become first and second Esdras. As regards the *first* book of Esdras, it is for the most part a transcript—and not a very accurate one—of Ezra and a portion of Nehemiah, together with the two last chapters of 2d Chronicles. It is impossible to ascertain anything regarding its age or authorship. Josephus quotes it extensively in his *Antiquities*, even when it contradicts *Ezra* proper, a fact which indicates that it was highly valued by the Jews. It may perhaps be interesting to notice that the hackneyed phrase, *Magna est veritas et prevalebit* (truth is great, and will prevail), is taken from the 41st verse of the 4th chapter of this book. The *second* book of Esdras, or Revelation of Esdras, is wholly different in character from the first, and it has even been doubted whether it is the work of a Jewish or of a semi-Christian writer. Lawrence and Hilgenfeld argue for its being composed 28-25 B.C.; Lücke, shortly after the death of Cæsar (44 B.C.); while Gfrörer, Bauer, and Wieseler assign it to a period as late as the reign of Domitian (81-96 A.D.). The opinion which has the weightiest evidence in its favor is, that the book was originally the composition of a Jew, but that it has been largely interpolated by Christian writers. The book was probably written in Egypt, and forms part of what has been called the "Apocalyptic Cycle" of Jewish literature (see REVELATION OF ST. JOHN). It consists of a series of angelic visions and revelations made to Ezra, regarding the mysteries of the moral world, and the final triumph of the righteous, who, however, are to be but "a very few." The descriptions are occasionally very striking, and even sublime, and if the doctrinal portions

contain the original views of a man living before the apostolic era, the source of the Pauline phraseology can in part be discovered.

ESENEBECKIA, a genus of trees of the natural order *diosmaceæ*. The bark of *E. febrifuga* is said to be equal in its effects to Peruvian bark. It is a tree 40 ft. high, a native of the s. of Brazil.

ESK (Gaelic, *uisg*, water), the name of several small Scotch rivers. The Dumfriesshire Esk is formed by the confluence of the Black and White Esk, which rise on the borders of Selkirkshire, near Ettrick Pen, the center of the southern Highlands, and run each 10 m. s.s.e. The united stream runs 35 m. s., and forms for a mile the boundary between Scotland and England. For the last 8 m. it runs s.s.w. in Cumberland, and finally falls into the head of the Solway firth. It flows in a Silurian, carboniferous, and Permian basin, through some charming scenery, past Langholm, Canobie, and Longton. The upper part of the valley of this E., which is wild and pastoral, is called Eskdale Muir.—The Edinburghshire North and South Esk rise in the n. of Peeblesshire, between the Pentland and Moorfoot hills, and both run n.n.e. through a beautiful tract in the e. of Edinburghshire, the n. branch, 20 m. long, passing Roslin and Hawthornden and the s. branch 15 m. long. The two branches unite in Dalkeith park, and run 3 m. n. into the firth of Forth at Musselburgh. The basin of the two streams is chiefly carboniferous.—The Forfarshire North and South Esk. The North Esk rises in the Grampians, in the n. of the county, and runs 25 m. s.e. into the sea, 4 m. n. of Montrose. At Ganachy bridge it runs half a mile through a sandstone gorge 20 to 30 ft. deep. In the lower half of its course it divides Forfarshire from Kincardineshire. The South E. rises in the Grampians of the w. of Forfarshire, and runs 40 m. s.e. and e., crossing the valley of Strathmore. It passes Brechin, and ends in the tidal basin or lagoon of Montrose. The basins of both consist of gneiss, mica-slate, clay-slate, and old red sandstone.

ESKIMO. See ESQUIMAUX.

ESKI-SA'GRA, or STARA-ZAGORA, a town of eastern Roumelia, is situated at the southern base of the Balkan mountains, 70 m. n.w. of Adrianople. In the vicinity are numerous gardens and orchards, and also several mineral springs, which are in great repute. Silk and wool are produced. Pop. 15,000 to 20,000.

ESLA, a river of Spain, and an important affluent to the Douro, rises in the province of Palencia, Old Castile, from the southern base of the Asturias mountains, 10 m. n.w. of the town of Valleburon. Throughout the whole of its course, it flows s.w., and joins the Douro 15 m. below the town of Zamora. It is 125 m. in length. Its waters, which are joined by numerous streams, are well stocked with fish.

ESMARCH, JOHANNES FRIEDRICH AUGUST, b. Tönning, Schleswig-Holstein, 1823; studied medicine at Kiel and Göttingen, and in the Danish war of 1848 served as lieutenant, as assistant surgeon, as chief physician of the citizens' hospital at Flensburg, and lastly as adjut. of Dr. Stromeyer, whose daughter he married. He became prof. and director of the hospital at Kiel, 1857, and during the Schleswig-Holstein war, 1864, and the Franco-Prussian war, 1870, held high official positions. He is the greatest living authority on gunshot wounds; has originated valuable improvements in barrack hospitals, ambulances, etc.; is the inventor of the bloodless method of operating on the extremities, which he has since combined with the antiseptic method of Lister; and has published *Beiträge zur Praktischen Chirurgie*, 1853-60; *Verbandplatz und Feldlazarett*, 1871; *Ueber Künstliche Blutleere bei Operationen*, 1873; *Die Erste Hilfe bei Plötzlichen Unglücksfällen*, etc. His second wife was the Princess Henrietta of Schleswig-Holstein, aunt of the Empress Victoria of Germany.

ESMERALDA, a co. in s.w. Nevada, on the California border, intersected by Walker river, and containing Walker lake, a large body of water having no known outlet; 8540 sq. m.; pop. '90, 2148. There are gold and silver mines, but little agriculture, the land, where not mountainous, being arid plains. Co. seat, Aurora. The great salt basin, in this county, is covered with pure salt, and is 16 m. long and 3 m. wide.

ESMERALDAS (signifying *emerald* in Spanish) denotes a river, a town, and a province, all in the state of Ecuador (q. v.) in South America.—1. The river rises near the city of Quito, and enters the Pacific after a course of 110 m., in lat. 1° 5' n., and long. 79° 40' w.—2. The town stands 10 m. from the mouth of the river, containing about 4,000 inhabitants.—3. The province, watered by the above-mentioned river, occupies the n.w. of Ecuador; is mostly covered with forests; and produces cacao and tobacco. Pop. 15,000.

ESNÉ, ESNA, or ESNEH, the hieroglyphic *Sen*, and the Greek *Latopolis* or *Lattónpolis*—the city of the latus fish or *latus nobilis*, from the fish there worshiped—is a thriving but badly built town of Upper Egypt, and is situated on the left bank of the Nile, in lat. 25° 15' north. It contains about 12,000 inhabitants, many of whom are Copts, and has some manufactories of fine cotton, shawls, and pottery. It is an entrepôt for the Sennar caravans. There are famous ruins at E., which consist of a sandstone temple, with a portico of four rows of six columns, which appears to have been founded by Thothmes III., whose name is seen on the jambs of a door. The temple, however, seems to have been restored or principally constructed by Ptolemy Eurgetes (246-222 B.C.), and the pronaos was erected in the reign of the emperor Claudius (41-54 A.D.), and completed

in that of Vespasian. The interior is of the date of Trajan, the Antonines, and Geta, whose name, erased or replaced by that of Caracalla, is there found. The great temple was dedicated to Chnumis, Satis, and Har-Hek. It has a zodiac like that of Dendera, formerly thought to be of the most remote antiquity, but now known to be no older than the Romans. A smaller temple with a zodiac, erected in the reign of Ptolemy Eurgetes, formerly stood at E'Deyr, $2\frac{1}{2}$ m. n. of E., but it has been destroyed. At E. is also a stone quay, bearing the names of M. Aurelius. This city was the capital of a nome, and the coins struck in it in the reign of Hadrian, 127-28 A.D., represent the fish latos.—Champollion, *Not. Descr.* p. 283; Wilkinson, *Mod. Egypt*, ii. p. 268; Tochon d'Anney, *Médailles*.

ESOCIDÆ, a family of malacopterous fishes, which is now regarded as including only the pikes (q.v.), but in which the flying fishes (*exocoetus*) and other fishes, now constituting the family *scomberesocidæ* (q.v.), and of the order *pharyngognaths*, were until recently included.

ESOP. See *Æsop*.

ESOPUS, a town in Ulster co., N. Y., bounded n.w. by the Wallkill river, and containing the manufacturing village of Port Ewen. Pop. 4659.

ESOPUS WAR, the name usually given to a war between the Indians and the Dutch settlers at Esopus in Ulster co., N. Y., which began in the summer of 1658 and lasted intermittently until 1664. In the former year some Indians, employed as field-hands by the Dutch, had become drunk and boisterous, and were fired upon by the farmers. This gave rise to a series of bloody reprisals on the part of the Indians, the most serious of which was the destruction of the village of Wietwyck, when 40 women and children were carried off as prisoners and 21 men were slain.

ESOTERIC (Gr.) is a term derived from the ancient mysteries, in which it was applied to those doctrines that were designed for the initiated, in contradistinction to those that were imparted to the uninitiated, which were termed *exoteric*. It is now used in various relations of an analogous kind.

ESPALIER, a term borrowed from the French, and signifying a railing on which fruit-trees are trained as on a wall. Such railings are very variously constructed—sometimes of wood, sometimes of iron, sometimes of upright rails held together by a horizontal rail at top, sometimes chiefly of horizontal rails with upright posts for their support. Espaliers may be very conveniently and cheaply made of strong iron wire, sustained by upright iron or wooden posts, as in ordinary wire fences. They vary in height from 4 to about 8 ft., according to situation and the size of the garden. They have the advantage of securing the fruit in a great measure from the effect of winds, which often shake off great part of the crop of standard trees whilst still unripe: and from the full exposure to sun and air, excellent fruit is produced, although there is no reflected heat as from a wall, which is therefore still superior.

ESPARTEÑO, JOAQUIN BALDOMERO, ex-regent of Spain, count of Luchana, duke of Vittoria, etc., was b. 27th Feb., 1792, at Granatula, in La Mancha (Ciudad Real), where his father, Antonio Espartero, followed the occupation of a cartwright. E. was intended for the ecclesiastical profession, and in 1806 went to the university of Almagro, but two years later, on the invasion of Spain by the French, he entered the sacred battalion (*battalion sagrado*), so called from being composed almost entirely of students. After the close of the war of independence in 1814, he went to South America, where he fought against the insurgents; but after the victory gained by Bolivar at Ayacucho, Dec. 9, 1824, had put an end to the Spanish rule on the continent of America, E. returned to Spain. In 1832, he declared himself openly in favor of the succession of the daughter of Ferdinand VII.; and on the breaking out of the civil war after the king's death, he soon rose to the rank of lieutenant. In Aug., 1836, he succeeded in saving the city of Madrid, and became successively gen.-in-chief of the army in the n., viceroy of Navarre, and capt.gen. of the Basque provinces. When the army of Don Carlos appeared before Madrid on the 12th Sept., 1837, E. had again the glory of saving the capital. His successful campaign of 1839, which resulted in the expulsion of Don Carlos from Spain, procured him the title of grandee of Spain, and duque de la Vittoria y de Morella. In 1840, the queen-mother, Christina, was compelled to resign her office of regent, and on the 8th of May, 1841, E. was appointed by the Cortes to supply her place until the queen (Isabella) should have reached her majority. E. guided the helm of the state with energy, firmness, and ability; but in 1843 an unscrupulous and unprincipled combination of parties naturally inimical to each other, the republicans and the moderados, brought about his fall. E. sailed for England, where he resided for four years. In 1847, he returned to Spain, and lived quietly at Logroño till 1854, when the wretched despotism and profligacy with which the name of Christina is associated, caused an insurrection of the people, and compelled the queen-mother to leave the kingdom. E. was again called to the head of the government, and conducted the affairs of the nation for two years; but in July, 1856, he was supplanted by gen. O'Donnell. In 1857, he resigned his dignity as senator, and after that time rarely took part in politics. After the revolution of 1868, which resulted in the expulsion of Queen Isabella, E. gave his full and hearty adhesion to the provisional government, though he

took no part in their proceedings. In 1870, E. was induced to become a candidate for the throne of Spain; but withdrew in June of the same year, alleging his age and the division of parties as excuse. In 1875, he adhered to King Alfonso. He died Jan., 9, 1879.

ESPERANTO, an artificial language, named from its inventor, a Spanish scholar, who first published it in 1890. It differs from Volapük (q.v.) in that its vocabulary is constructed upon such words only as are common to *all* European languages. Hence it will at the outset be easy of acquisition, and will not appear uncouth or strange to any. The following comparison will serve to illustrate the difference between English, Volapük, and Esperanto.

In English.—"The international language should be comprehensible to the whole educated world; but no man on the earth, except the Volapükist, would comprehend even the word 'Volapük.'"

In Volapük.—"Pük bevünetik pakapälom fa vol lölik pekulivöl; abu men nonik tala sesumü volapükels, kapalom püki lekanix 'Volapük.'"

In Esperanto.—"La lingvo internacia estas komprenita de la tuta mondo edukita; sed nenia homo sur la tero eksklusive la volapükistoj komprenas la artan lingvon 'Volapük.'"

ESPINASSE, JULIE JEANNE ELEONORE DE L', one of the most fascinating women of her time, and one who combined sparkling gifts with a heart susceptible of the strongest affections, was b. at Lyons, 19th Nov., 1732, and was the illegitimate daughter of a Mme. d'Albion. After the death of her mother, Mlle. de l'E., who had received an excellent education, went to live at the house of her brother-in-law, the marquis de Vichy-Chamroud, in whose family she held the position of *gouvernante*. In 1752, she left her brother-in-law's house, and went to Paris in the quality of *demoiselle de compagnie* to the marquise Du Deffand (q.v.). The two ladies lived together for a time most agreeably, until it became evident that the charms of the young and beautiful *demoiselle* had enlisted on her side the admiration of the circle in which Du Deffand had formerly been the chief attraction. Even D'Alembert, the famous encyclopédist, who hitherto had been the most constant admirer of Du Deffand, now manifested an entire devotion to the younger and more fascinating Espinasse. A rupture between the ladies was the consequence. The friends of E., however, obtained for her, through the duc de Choiseul, an annuity from the king. It is said that D'Alembert sought her hand in vain. She died 23d May, 1776. Her *Lettres*, etc. (Paris, 1809), bear witness to her remarkable cultivation.

ESPIRITU SANTO, besides having been long applied by the Spaniards to their imaginary continent in the southern hemisphere, denotes various actual localities.—1. E. S. is a small maritime province of Brazil, extending in s. lat. from 18° 30' to 21° 20', and lying immediately to the n. of the metropolitan province of Rio Janeiro. This province contains also a town and a bay of its own name.—2. E. S. is the largest and most westerly island of the New Hebrides, being in lat. 15° s., and long. 167° east. It is said to measure 80 m. by 40.—3. E. S. is a cape of Tierra del Fuego, in lat. 52° 38' s., and long. 68° 37' west.—4. E. S. is a considerable town near the center of Cuba. It contains about 9,982 inhabitants, fully one half being whites.—5. E. S. is a bay of the gulf of Mexico, forming part of the almost continuous back-water of Texas. It is in lat. 28° 30' n., and long. 97° 30' west. Towards the open sea, it is breasted by Matagorda island, and on the side of the mainland, it receives the Guadaloupe.

ESPLANADE (in fort.) is the open space intentionally left between the houses of a city and the glacis of its citadel. It requires to be at least 800 paces broad, that the enemy, in case of his getting possession of the town, may not be able to assail the citadel under cover of the nearest houses. For this purpose, the citadel must command the E., and be able to send a direct fire into the streets opening upon it. In old works on fortification, the term is often applied to the glacis of the counterscarp, or the slope of the parapet of the covered way towards the country.

ESPOUSAL. 1. Among the Jews. the ceremony of betrothal or of engagement to be married. It was entered into a year or more before marriage, and consisted in giving and receiving before witnesses, either a piece of silver as a pledge, or a written contract wherein the bridegroom bound himself to give a certain sum as a portion to the bride. From the time of espousal the woman was considered as the lawful wife of the man to whom she was betrothed. 2. In the early Christian church also, a ceremony of espousals preceded marriage. The preliminaries consisted in a mutual agreement between the parties that the marriage should take place within a limited time, confirmed by certain donations as the earnest of marriage, and attested by a sufficient number of witnesses. The free consent of parties contracting marriage was required by the old Roman law and by the code of Justinian. The gifts bestowed were publicly recorded. The dowry settled on the bride was stipulated in public instruments under hand and seal. The ring was given at the betrothal rather than at the actual marriage. The use of the marriage ring has been traced to the 10th c., its recognized place being then as now on the woman's fourth finger. The witnesses present, friends of both parties, were usually ten in number. The espousal, as incorporated with the wedding-rite, is plainly traceable in the usages of the Roman, Anglican, and other churches at the present day.

ESPRIT DE CORPS (Fr.), the animating spirit of any body; loyal attachment to the body or order of which one happens to be a member, as to the army or the bar.

ESPRIT D'IVA, an aromatic liquor made in Switzerland, from a plant called *GENIPI* (*achillea moschata*, or *ptarmica moschata*; see *ACHILLÆA*). Like the *Swiss tea* made from the same plant, it possesses sudorific properties.

ESPRITS FORTS (advanced thinkers, bold spirits), the name assumed by the French school of writers in England termed freethinkers (q.v.), and including Voltaire, Diderot, Helvétius, D'Alembert, and their contemporaries, who were the precursors of the revolution. While the English freethinkers aimed at securing freedom of religious speculation merely, and did not seek the violent substitution of a system based upon their own views for the existing order, the French *esprits forts* held a distinctly aggressive position outside of all religious confessions, vigorously opposed the despotism of church as well as of state, and were, in fine, propagandists of the most radical sort. This is shown by the vehemence and bitterness of their language, and by the rigidity of their philosophical system. Skeptical of the value of human feeling as a guide, they desired the authority of pure reason alone to be recognized, and the supremacy of the intellect to be everywhere acknowledged. Their influence was extensively felt, and many of the doctrines which they inculcated bore fruit in the revolution. See *AGE OF REASON*.

ESPY, JAMES POLLARD, one of the most original and able meteorologists of the present century, was the son of a farmer in Washington co., Penn., where he was b. May 9, 1785. He received a superior education, and, during the earlier part of his career, was one of the best classical and mathematical instructors in Philadelphia. E.'s attention was first strongly turned to science by the writings of Dalton and Daniell on meteorology. After some time, his enthusiasm became so great, that he resolved to give up teaching, and to rely for the means of prosecuting his meteorological researches upon his slender savings and the success of his lectures on the subject, which, fortunately, turned out to be far more attractive than the average of popular lectures. His first course was delivered before the Franklin institute of Pennsylvania. E.'s theory of storms (with which his name is specially connected) drew general attention to itself, especially in the United States. See *STORMS*. A memoir on this subject gained for him, in 1836, the Magellanic premium of the American philosophical society of Philadelphia. In 1841, appeared his work on the *Philosophy of Storms*, regarding which the report of the *Académie des Sciences* (Paris) says, "that the theory on which it is based alone accounts for the phenomena. . . . In a word, for physical geography, agriculture, navigation, and meteorology, it gives us new explanations, indications useful for ulterior researches, and redresses many accredited errors." Later in his life, E. became professor in the Philadelphia high school, and afterwards in the Franklin institute of that city. He traveled extensively through the United States, lecturing on his favorite theory of storms, and studying the laws of climate, until he acquired the popular title of the "storm-king." After the organization of the Smithsonian institution at Washington, he was commissioned by Dr. Henry, its superintendent, to pursue his researches. It was in the halls of the Smithsonian that his experiments on the rate of cooling of gases of different densities when expanded were made. The cooling effects of expansion on dry and moist air also formed the subject of nice experiments. The results of these experiments have thrown much light on the formation of cloud and rain, and the propelling power of winds. They afforded materials for his elaborate and valuable reports on meteorology, presented to the senate of the United States. Four of these reports were published at the expense of government. The last was issued in 1857, which embodies all his matured opinions on meteorological phenomena. He d. in 1860.

ESQUIMALT, an important seaport of British Columbia, Canada; on Vancouver island and the strait of San Juan de Fuca; 4 miles from Victoria. It has an extensive harbor capable of accommodating the largest vessels afloat; has been made the principal British naval station on the North Pacific, with navy yard, dry dock, hospital, and defensive works. The mean temperature for a term of five and a half years was 48.7° F.; the rainfall, 24.82 inches. Pop. '91, 200.

ESQUIMAUX, or *ESKIMOS*, is the name of a nation inhabiting the coasts of all the seas, bays, inlets, and islands of America n. of the 60° of n. lat.; from the eastern coast of Greenland, in long. 20°, to the strait of Behring, in long. 167° west. On the Atlantic, they are to be found along the entire coast of Labrador to the strait of Belleisle and down the e. side of Hudson's bay nearly as far as James's bay; while on the Pacific they reach as far as the peninsula of Alaska. They are also to be met with on the Asiatic side of Behring's strait, and, though few in number, may be regarded as the most widely spread nation in the world, occupying, according to Mr. Gallatin, not less than 5,400 m. of coast, without including the inlets of the sea. "The Eskimo," says Dr. Latham, "is the only family common to the old and new world—an important fact in itself, and one made more important still by the Eskimo localities being the only localities where the two continents come into proximity." Nothing, however, has as yet come out of a consideration of this fact in the way of tracing, with absolute certainty, a connection between the E. and any well-defined Asiatic race. The name itself, *Esquimaux* or *Eskimo*, does not help us in any such attempt, being from an Algonquin or Abenaki word, signifying "eaters of raw flesh." This is not the native name, for they call them-

selves "Inuit," or "people;" the Scandinavians of the 10th c. called them "Skroellin-gar," or "wretches;" while the seamen of the Hudson's bay ships designate them as "Seymos," or "Suckemos"—appellations, according to Richardson, "evidently derived from the vociferous cries of Seymo or Teymo with which the poor people greet the arrival of the ships." The E. are usually reckoned by ethnologists to belong to the Mongolian race, but Duponceau and Gallatin find a strong resemblance between them and the red Indians of North America, which is the view also taken by Prichard—the last mentioned regarding them as a kind of link between the northern Asiatic and American family of nations. Latham, on the other hand, pronounces them to be Mongolian in physiognomy, with flat nose, projecting cheek-bones, eyes often oblique, and skin more brown than red or copper colored; thus presenting a marked contrast to the North American Indians. Their language, however, is, he acknowledges, American in respect to its grammatical structure, being composed of long compound words, and regular, though remarkable, inflections. With respect to the complexion of the E., sir John Richardson is of a different opinion from any of these authors, describing it as nearly white, when relieved from the smoke and dirt with which it is usually incrustated. Many of the young women, he considers, may even be called pretty, when this operation has been performed. "The young men," he says, "have little beard; but some of the old ones have a tolerable show of long gray hairs on the upper lip and chin, which the red Indians never have, as they eradicate all stray hairs. The Eskimo beard, however, is in no instance so dense as a European one." In stature, the E. are usually represented as not being more than 5 ft. in height; but the authority just mentioned describes them as ranging from 5 ft. to 5 ft. 10 in., and even more. They are broad-shouldered, and, when seated in their boats, look tall and muscular, but, when standing, appear to lose some of their height, from the shortness of their lower extremities. The E. live usually throughout their long lines of coast in small villages, containing about five or six families each. The men occupy themselves entirely in hunting, while the women perform the domestic drudgery, which consists principally in preparing the food, of which both sexes consume a large quantity. This is almost entirely of an animal nature, but not without variety, embracing the reindeer, geese and other birds, the seal, walrus, salmon-trout, and various other kinds of fish. They are expert hunters and fishers, and, aided by their dogs, make considerable havoc among the arctic animal tribes. Where whales are common, Aug. and Sept. are devoted to the pursuit of these animals, and great joy is manifested when they capture any of them, as from the blubber of these they get their supply of oil for lights in the long winter season. Of vegetables, they scarcely taste any except in the autumn. "Carbon is supplied to the system by the use of much oil and fat in the diet, and draughts of warm blood from a newly-killed animal are considered as contributing greatly to preserve the hunter in health." The habits of the E. are filthy and revolting in the extreme. A great part of their food is consumed without any attempt at cooking it, and they drink the blood of newly-killed animals as the greatest delicacy that could be offered them. In the short summer, those who can afford it live in tents; but in the winter they all equally live in snow-huts, the stench of which, from the offal with which they are stored, and the filthy oil that gives them light, makes them insupportable to the European. The dress of both sexes is nearly the same, consisting of the skins of animals, reindeer, birds, and even fish—whatever conduces most to warmth, without much regard to appearance; but in their winter abodes they usually wear nothing except trousers. Their religion consists principally in superstitious observances, but they believe, we are told, in two greater spirits, and many lesser ones. The Moravian mission in Greenland, commenced by the benevolent Hans Egede (q.v.), in 1721, has succeeded in converting many of them to Christianity; and they are represented by the missionaries to be a mild and teachable people, easily led by kindness to distinguish between what is morally right and wrong. Where the missionaries, however, have not penetrated, Arctic voyagers generally speak of them as honest among themselves, but incorrigibly dishonest and prone to lying and exaggeration with strangers.—See Dr. Rink's *Tales and Traditions of the Eskimo*. See *ILLUS.*, NORTH AND SOUTH AMERICA, vol. I.

ESQUIMAUX DOG, a kind of dog extensively spread over the most northern regions of North America and of eastern Asia; large, powerful, with long rather curling hair, tail much curved over the back and very bushy, short and pointed ears, and somewhat wolf-like aspect. These dogs are much used for drawing sledges. They are very sagacious, docile, and patient. The color is generally black and white, brown and white, or dingy white.

ESQUIN TLA, or **ESCUINTLA**, a t. of the state of Guatemala, Central America, 25 m. s. from Guatemala, on the river Michatoya, which falls into the Pacific ocean. It has a fine church. Pop. 6,000, consisting in great part of Indians.

ESQUIRE (Fr. *escuyer*. a shield-bearer, from Lat. *scutum*, a shield). The E. in chivalry was the shield-bearer or armor-bearer to the knight, and hence was called *armiger* in Latin. He was a candidate for the honor of knighthood, and thus stood to the knight in the relation of a novice or apprentice, pretty much as the page did to him. In this capacity he was spoken of as a bachelor, just as the knight-bachelor came latterly to be distinguished from him who had already attained to the higher honors of

chivalry. When fully equipped, each knight was attended by two esquires. The E. was a gentleman, and had the right of bearing arms on his own shield or escutcheon, which is surmounted by a helmet placed sideways, with its visor closed, to distinguish him from a knight or nobleman. He had also the sword, the emblem of chivalry, though he was not girded with the knightly belt. His spurs were silver, to distinguish them from the golden spurs of the knight; and when the king created esquires of old, it was by putting silver spurs on their heels, and collars of SS round their necks. Those who received this honor directly from the sovereign were in general the esquires for the king's body, or those whose duty it was to attend him in his capacity of a knight; an office now nearly obsolete. Tenants of the crown who held by knight's service were a class of feudal esquires generally supposed to correspond to the simple *ritters* or knights of Germany, as opposed to the *ritters* who were *geschlagen* or dubbed, inasmuch as these English esquires were entitled to claim the rank of knight-hood. Though the title of E. has now come to be given without discrimination to all persons above the rank of a tradesman or shopkeeper, the following seem to be those whose claim to it stands on the ground either of legal right or of long-established courtesy: 1. All the untitled sons of noblemen; 2. The eldest sons of knights and baronets; 3. The sons of the younger sons of dukes and marquises, and their eldest sons. All these are esquires by birth. Then there are esquires by profession, whose rank does not descend to their children; and esquires by office—e.g., justices of the peace—who enjoy the title only during their tenure of office.

ESQUIROL, JEAN ETIENNE DOMINIQUE, one of the greatest physicians for the insane of modern times, was b. at Toulouse, 4th Jan., 1772. He served in the military lazaretto at Narbonne in 1794, obtained his degree of doctor in 1805, and was appointed physician to the Salpêtrière at Paris in 1811. After 1817, he delivered clinical lectures on the diseases of the mind, and their cures; in 1818, his exertions secured the appointment of a commission, of which he became a member, for the remedy of abuses in mad-houses; in 1823, he became inspector-general of the university; and in 1825, first physician to the *Maison des Aliénés*. In the following year, he was also appointed principal physician of the private lunatic asylum at Charenton, which he had organized with admirable skill. At the July revolution, he lost all his public offices, and withdrew into private life. He died 12th Dec., 1840. E. combined, in a truly rare and wonderful manner, the qualifications requisite for a physician of the body and a physician of the mind. By his humane and moral treatment of the insane, he often effected the happiest cures. His writings embrace all the questions connected with the treatment of insanity. E. also paid great attention to a very important subject, viz., the construction of suitable buildings for the insane; and most of the modern lunatic asylums in France, such as those of Rouen and Montpellier, have been built according to his advice. His most important work is *Des Maladies Mentales considérées sous les Rapports Médical, Hygiénique et Médico-légal* (1838).

ESQUIROS, HENRI ALPHONSE, a poet and romancist of France, a representative in the national assembly, was b. at Paris in 1814. He made his *début* as an author in 1834, when he published a volume of poems, entitled *Les Hirondelles*, which, although highly praised by M. Victor Hugo, had but a very limited sale. *Les Hirondelles* was followed by two romances, *Le Magicien* (1837) and *Charlotte Corday* (1840). About this time he also published a philosophic and democratic commentary on the life of Christ, under the title of the *Evangile du Peuple* (1840). For the publication of this work, E. was prosecuted, and sentenced to 8 months' imprisonment and to a fine of 500 francs, 30th Jan., 1841. In the same year he published his *Chants d'un Prisonnier*. He also wrote three little works between 1841 and 1842—these were *Les Vierges Martyres*, *Les Vierges Folles*, and *Les Vierges Sages*. His *Histoire des Montagnards* appeared in 1847. After the revolution of Feb., 1848, E. was elected a member of the legislative assembly. Distinguished by his radical opinions, he was included, after the 2d Dec., 1851, among the number of members to be expelled; on which he retired to England. His *La Vie Future au Point de Vue Socialiste* appeared in 1857; and his *La Morale Universelle*, his *L'Angleterre et la Vie Anglaise*, and his *La Neerlande et la Vie Hollandaise* in 1859. In 1869, he was returned to the corps législatif for the fourth circumscription of the Bouches du Rhône; and was appointed supreme administrator of that department by the government of the national defense in 1870. In 1871, he was returned to the national assembly, and in Jan., 1876, was made a member of the senate. He died 13th May, 1876, at Versailles.

ESS, HEINRICH LEANDER VAN, or JOHANN HEINRICH, 1772–1847; b. Westphalia; educated in the Dominican gymnasium of Warburg; a Roman Catholic priest from 1797 to 1812; and then professor of theology in the Marburg seminary. In 1807, he published the New Testament in German, but its circulation was forbidden by the pope. The next year he published a defense of his views, advocating the reading of the Bible by the people. In 1816, he published *What was the Bible of the first Christians?* and in 1818, *The Bible not a Book for Priests*. In 1840, he completed a German translation of the entire Bible. His library of 20,000 volumes, unusually rich in early editions of the con-

troversial works of the period of the reformation, was purchased after his death, and given to the Union theological seminary in New York.

ESSAAD-EFFENDI, MOHAMMED, a Turkish historian, was b. at Constantinople, 16th Dec., 1790. He was surnamed Sahaf-Zadeh, "son of the bookbinder," on account of his father having been president of a corporation of bookbinders and librarians. At the age of 18, he became a teacher; in 1825, he was appointed historiographer to the Ottoman empire. In 1831, the superintendence of the *Tutawin-i-wekaii* (Table of Events), the official journal of the empire, was placed in his hands. In 1835, he was employed by the late sultan Mahmoud on an embassy to Mohammed, the son and successor of the king of Persia. E. had also the titles of grand judge of Roumelia, inspector-general of schools, and member of the council of public instruction.

The works of E. comprise, among others, the *Uss-i-Tzafer* (the Establishment of Victory), a work which has been translated into French, and published by M. Causin de Perceval, with the following title: *Historic Summary of the Destruction of the Janizaries by the Sultan Mahmoud in 1826* (Par, 1833).

ESSAYS AND REVIEWS, by six clergymen and one layman of the Church of England (the Rev. Drs. Frederick Temple and Rowland Williams, Prof. Baden Powell, H. B. Wilson, Mark Pattison, Prof. B. Jowett, and Mr. C. W. Goodwin), were published in an 8vo. vol. in Mar., 1860. The book did not excite much attention at first, but having been severely censured for heterodox views by nearly all the bishops and many of the clergy, it created much excitement in 1861, and was condemned by convocation June 24, 1864. The ecclesiastical courts sentenced the Revs. R. Williams and H. B. Wilson to suspension for one year, and costs, Dec. 15, 1862; but on appeal the sentence was reversed by the judicial committee of the privy council, Feb. 8, 1864. The most remarkable among the works put forth in opposition (in 1862) are the *Aids to Faith*, edited by the bishop of Gloucester (W. Thomson, later archbishop of York), and *Replies to Essays and Reviews*, edited by the bishop of Oxford (Samuel Wilberforce). The appointment of Dr. Temple to the see of Exeter was much opposed on account of his essay in this collection.

ESSEG. See ESZEK.

ESSEN, a t. in Rhenish Prussia; situated between the Ruhr and the Emscher, 20 m. n.e. of Düsseldorf, stands in the midst of a rich coal and iron district. Its main importance lies in its activity as a manufacturing town; it has, however, an imposing cathedral, containing many curious reliquaries, crosses, etc. Owing to the productive coal mines, there are in the neighborhood extensive works for all sorts of manufactures in iron. The enormous works of Herr Krupp, the discoverer of the method of casting steel in very large masses, are at Essen. At them are manufactured many articles for peaceful purposes; but the gigantic steel guns which the Germans used with such terrible effect at the siege of Paris (1870-71) have made the name of Krupp world-renowned. The rapid increase in population raised the prices of all commodities consumed by the workmen, and to meet this evil the firm of Krupp established an immense system of co-operative stores which have been very successful. See CO-OPERATION. Pop. '95, 96, 163. Although the industrial activity of E. is only of recent growth, the town itself is very old, and can trace its origin to the famous Benedictine nunnery of the same name, founded in 873 A.D.

ESSEN, HANS HENRIK, Count, 1755-1824; born Sweden; educated in the State university; accompanied Gustavus III. in his travel abroad. He attended the king at the masked ball where the latter was assassinated by Anckarstroem, Essen having warned Gustavus of a probable attempt on his life. In later years, Essen was governor of Stockholm, governor-general of Swedish Pomerania and Rügen, and in 1807, commander of the Pomeranian army, distinguishing himself by the defense of Stralsund. Still later he was a member of the council, and ambassador in Paris. After the union of Sweden and Norway he was appointed governor of the latter country, and in 1817, governor-general of Scania.

ESSENCE, in philosophy (from Lat. *esse*, to be), is that which constitutes the particular nature of a being or substance, or of a genus, and which distinguishes it from all others. Locke's statement, that E. may be taken for the very being of a thing, whereby it is what it is, agrees with this definition. He makes, also, a distinction between nominal and real E., saying, for example, that the nominal E. of gold is the complex idea expressed by the word; and that its real E. is the constitution of its insensible parts on which its properties depend and which is unknown to us. In theology, Athanasius and other Greek writers distinguish *ousia* (essence or substance), denoting what is common to the Father, Son, and Holy Spirit, from *hypostasis*, denoting what is individual, distinctive, and peculiar. In modern writers, essence and substance are generally used as virtually synonymous, and representing, in any object, all that the human mind cannot know, while all that can be actually known is called quality or accident. As both terms are often vaguely employed, it is necessary, wherever they occur, first of all to ascertain the sense in which the writer intends them to be understood.

ESSENCE DE PETIT GRAIN is obtained by distillation from small unripe oranges, about the size of a cherry, and is used as a perfume in the same manner as *orange-flower water*.

ESSENCES are solutions of the essential oils in alcohol, and may be prepared (1) by adding rectified spirit to the odoriferous parts of plants, or to the essential oils, and distilling; or (2) simply by adding the essential oil to the rectified spirit, and agitating till a uniform mixture is obtained. Thus, the essence of lemons is merely a solution of the volatile oil of lemons in rectified spirit. This term is frequently used as synonymous with volatile oils.

ESSE'NES (*Essēnoi*, *Essaioi*), a small religious fraternity among the Jews, whose name and origin, as well as character and history, are alike involved in obscurity. Still, in the wide field of the history of the Semitic religions, there are not many subjects of inquiry of greater importance, or calculated to inspire a deeper interest. The E. bore one of the most momentous parts in the development of Judaism. Christianity stands in so close connection with them, that John the Baptist and Christ himself have been pronounced to have originally issued from their ranks. More surprising than all, out of Essenism, in the stage of Sabæism, has sprung Islam itself, and in this last development of its tenets and practices are still preserved some of its principal rites. It is but natural that from the days of the fathers to our own, an infinite number of writers, more or less qualified for the task, should have endeavored to throw light on this mysterious brotherhood, but with success far from satisfactory. The reason of this is obvious enough. Josephus, Philo, Pliny, Solinus, Eusebius, and the fathers generally, were considered the sources, and the only sources, from which the genuine history of this fraternity could be deduced. Of these, Pliny indeed has a geographical notice, which cannot be traced to either Philo or Josephus; but the rest have so evidently derived their shallow and contradictory accounts indirectly, and through corrupted channels, from those two writers, that they lose all claim to consideration. Of the two books of Philo in which information regarding the E. is contained, one (*De Vita Contemplativa*) is proved to have been written about three centuries after Philo's death by a Christian monk as a penegyric on ascetic monachism. The other (*Quod Omnis*) is, to say the least, of doubtful genuineness, and is, moreover, at variance with Josephus. As to Josephus himself, it is now pretty generally allowed that his E. stand in much the same relation to the historical E. as the ideal inhabitants of the *Germania* of Tacitus stand to the real Germans of his time. Strange that for so many centuries the real and genuine sources—the Talmudical writings—should never have been thought of. These, together with Josephus and Philo, Pliny, and the Arabians Macrisi and Abulfarag, will perhaps better enable us to form an idea, not only of the real state of this community, but, what is of no less moment, to trace the process by which they gradually arrived at their peculiar mode of life and worship. We need not remind the reader that we must strictly confine ourselves here to an epitome of facts and conclusions.

We have to premise, that exception must at the outset be taken to the opening statement of Josephus, that there were three different "sects" among the Jews: the Pharisees, the Sadducees, and the E.—a statement which has been copied and accepted from that day to the present. The Sadducees were a political party, nothing more or less, and, as a matter of course, held religious views antagonistic to, or rather they did not accept the traditions of, their adversaries, the Pharisees, who, again, forming as they did, the bulk of the nation, cannot rightly be called a *sect*. Least of all were the E. such. They were Pharisees of stronger convictions, and carried out the Pharisaic views with a consistency which made them ridiculous even in the eyes of their own mother-party (Sota, 26, a.); neither were they known by the names of E., this being a very late designation, derived either from a Chaldee word *sacha*, and meaning bathers, or baptists; or from *asa*, meaning healers. The Mishna, Beraitha, and Talmud speak of these advanced Pharisees in general as Chasidim (*Assidaioi*, pious men), Nazirim abstinentes), Toble Shachārith (hemerobaptists), Banai (builders), and Chaberim (friends). The Arabic book of *Maccabees* calls the E. simply *Assidaioi*, and Macrisi speaks of "Nazirs, Essenes, and Baptists" as all being "Asaniun," or Essenes.

The Nazirhood, a kind of voluntary priesthood, enjoining abstinence from wine, flesh, and other sensual enjoyments, had, in the troublous times of anti-Syrian agitation, and the general upheaving of society, found numerous adherents (*Tosifta Nazir*, c. 4; *Talm. Babli Berach*, 48, a. 1; *Macc.* ii. 49; *Jos. Antiq.* xviii. 1); and gradually there sprang up (contrary to the Bible, which restricts this asceticism to a certain period) a host of men calling themselves "Nazirs forever"—Nazire olam (*Nazir* 4, a.). Pharisees of a spiritual and contemplative bias, with no natural taste for the conflicts and activity of political or public life, or wearied, perhaps, with the vanity of human aims, took this vow of Nazirship for life, and constituted themselves into a sort of religious club. Levitical purity in its strictest and highest sense made them draw closer and closer the innumerable "fences" which the traditional law had erected round the biblical law. Any one, friend or foe, could, at any moment, by having touched something impure, disturb this purity for the time, and necessitate new and endless purifications. Thus it became necessary, or at least expedient, that those among them who could break all ties of friendship and family, should retire into a solitude not easily approach-

able by a stranger to their community. Food, again, could not be prepared save by those of the brethren who knew and strictly obeyed the hyper-traditional injunctions. Their dress, every implement of daily use, had to be made under similarly stringent laws of purity. A natural consequence of this their exalted notion of outward priesthood, was—the different phases of woman's life taken into consideration—their general celibacy. (The explanation given by Josephus—the fear of the corruption of both towns and women—is entirely gratuitous, and utterly in discordance with the Jewish notions of the time.) In this state of voluntary isolation, trading was out of the question; they tilled the ground, and lived on the fruits of the earth. Taking their meals, and these of the coarsest and plainest description, in common, they idealized the table into an altar, and, prayer having been said, they remained standing silently round it during the repast. That they had no individual property, follows of course, and their communistic motto, which the Mishna (Aboth) has preserved to us—"Mine is thine, and thine is mine"—explains itself. We need not enlarge further on their small eccentricities—on the white linen garment, the apron (*kenaphaim*), the scoop or shovel; they are, one and all, signs and symbols of Levitical purity, the scoop reminding us of a certain Mosaic ordinance during the wanderings in the desert, the apron becoming necessary from the frequent ablution of their hands. Every morning, they bathed, like the priests who ministered in the temple, in pure spring water. They abhorred blood as a source of impurity, and for this reason, probably, some of them abstained also from going up to the temple, where sacrifices were daily offered; others we find present at a festival in the temple (*Succah*, 51, 53). Their offerings were sent alive under the care of messengers. But these were but outward signs of purity, stepping-stones to inner piety, to communion with God, which was only to be acquired, according to their notion, by solitude and an ascetic life. The belief in the efficacy of the most rigid simplicity and willing self-sacrifice, they held in common with the Pharisees; their horror of oaths, their frequent prayers, their occupation with mystical doctrine, were their own. Untroubled by the noise of war or the strife of parties, leading a life divided between the bath, ablutions, contemplation, and prayer; despising the body and bodily wants; what more natural than that by degrees they should be led into a kind of mystical enthusiasm and fanaticism. They allegorized, they symbolized; and their efforts culminated in seeing the unseen. Absorbed in the attempt to fathom the mysteries of the nature of God, one of their principal occupations was the study of the name of God; of that unpronounceable name which only the high-priest dared utter once a year in the holy of holies during the most awful and solemn service on the day of Atonement. The knowledge of that name in four, in twelve, and in twenty-four letters, would give them the power of prophecy and of "receiving the Holy Ghost."

Angelology, derived from the Magi, formed a prominent feature of their creed. In course of time, they were looked upon by the vulgar as saints and workers of miracles. A wonderful book of cures (*Sepher Refuoth*), which Talmudic, Arabic, and Byzantine authorities alike ascribe to Solomon, was in their hands, and with this, "by the aid of certain roots and stones," by the imposition of hands, and certain whisperings—a practice strongly condemned by the Pharisees (*Synhedr.* 90, a.)—they cast out demons, and healed the sick. Philosophy they regarded in so far only as it treated of the existence of God. Jehovah is the original light; from him proceed a number of spirits (the Platonic ideas), and at their head stands the wisdom, or *logos*, into which, after death, the soul is again absorbed. Their code of ethics was threefold—the love of God, of virtue, and of man; their scale of perfectibility reaching its acme in the communion with the Holy Ghost (*Ruach Hakodesh*), (*Mishn. Sota*, 99). In fine, mixing up, in the strangest manner, the most exalted and the most puerile notions, they became the forerunners of the Christian Gnostics and of the Jewish cabalists, and, it may be, of many secret, still existing orders, who may have derived from this source their ceremonies and the gradations of initiation.

They seem never to have numbered more than 4,000, including even those Nazirs or E. who remained in their own families. Their colony appears to have been established chiefly near the Dead sea, and it is undoubtedly this colony which has served Josephus as a basis to his romantic E. republic. But, however distant from each other they might be, a constant intercommunication was kept up through a body of delegates, or angels (*Malachim*). As they had sprung from the Pharisees, so they again merged into them—part of them, we should rather say; the remaining part became Therapeutæ, or Christians. See THERAPEUTÆ and JEWISH SECTS. The Talmud gives a distinct account of their ceasing to exist as a separate community (*Bechorot*, 27), and so soon after their extinction did they fall into oblivion, that in the third century we find a Jewish sage asking who these *Hemerobaptists* had been (*Berachot*, 22, 1).

Much has been written and said of a certain literature which they possessed; on this we are unable to decide, deprived as we are of all trustworthy authority. One fragment only remains; it is quoted in the Talmud (*Jerusch. Berachoth*. End) in the following words: "It is written in the book of the *Chasidim*, If thou leavest it (the divine law) for one day, it will leave thee for two."

In addition to the Talmud and Midrash, we refer the reader to Josephus, *Antiq.* xv. 10, xviii. 1, *Jewish War*, ii. 7, 8; Philo, *Quod Omnis Prob. Lib.* § 12; Pliny, *Hist. Natur.* v. 17; Epiphanius, *Hæres.* xxix.; Hieronymus, Cyril, Chrysostom, etc. Beckermann, *Ueber die*

Ess. (1821); the histories of the Jews by Iost, Ewald, and Grätz; articles by Franckel; Sprenger's *Leben Mohammad's* (1861); and Lucius, *Der Essenismus* (1881).

ESSENTIAL NOTES in melodies are the notes that determine the nature of the accompanying harmony, so called to distinguish them from the *accidental* notes, which are of a purely ornamental character. Essential notes succeeding each other in a measure or part of a measure, and sometimes in more than one measure, belong to one chord.

ESSENTIAL OILS. See **OILS**.

ESSEQUIBO, the most westerly of the great rivers of British Guiana, rises in the Acarai mountains, 41 m. n. of the equator, and after a course of 620 m. enters the Atlantic near the Venezuelan frontier, forming an estuary 20 m. wide, in which lie numerous fertile islands. The E. receives numerous large tributaries, as the Cuyuni and Mazaruni; on the Potaro, another affluent, is the magnificent Great Kaietur fall, above 700 ft. in sheer descent, discovered in 1870. On the banks of the E. are forests of locust-tree, iron-wood, ebony, greenheart, and other fine timber trees, festooned with orchids, and laced together with lianas and other climbing plants. Beyond the forests are vast savannahs, formerly forests destroyed by fire, and now swamps of brushwood, reeds, and coarse grass. Its navigation is obstructed by cataracts and rapids. The region adjoining the river was the subject of the conflicting claims between the British and Venezuelan governments which led to the formation of the arbitration treaty of Feb. 2, 1897. See **ARBITRATION**. E. is also the name of one of three counties into which British Guiana is divided, the other two being Berbice and Demerara.

ESSES, **COLLAR OF**, a chain-like collar, composed of links in the shape of the letter S, found in various old insignia of England. It is said to have been worn by esquires especially. Some claim the SS to be the symbol of Saint Simplicius.

ESSEX, a co. in n.e. Massachusetts, on the New Hampshire border and the ocean, traversed by the Merrimack and Ipswich rivers, and the Boston and Maine, and several branch railroads; 503 sq. m.; pop. '90, 299,995. It has a rugged and uneven surface, and its business is mainly in manufactures of cotton, wool, leather, etc. There are quarries of granite and syenite. There are several cities and large towns in the co., and it has three co. seats, Salem, Newburyport, and Lawrence. It includes Cape Ann.

ESSEX, a co. in n.e. New Jersey, almost encircled by the Passaic river, and bordering on Newark bay; intersected by the Pennsylvania, the Delaware, Lackawanna, and Western, the Central of New Jersey, the Lehigh Valley, and the Erie railroads; 127 sq. m.; pop. '90, 256,098. The soil is fertile; but besides market gardening there is little of agriculture, the people being mostly engaged in manufactures. Co. seat, Newark.

ESSEX, a co. in n.e. New York, w. of lake Champlain, on the head waters of the Hudson, and intersected by Au Sable river, and the Champlain division of the Delaware and Hudson canal company's railroad; 1667 sq. m.; pop. '90, 33,052. In the w. part of this co. are the highest peaks of the Adirondacks, covering a large region entirely unsettled. The soil is fertile. There are beds of magnetic iron ore, and a number of extensive iron works. There are nearly 100 lakes, large and small, in the county. Co. seat, Elizabethtown.

ESSEX, the n.e. co. of Vermont, between the Connecticut and Passumpsic rivers, crossed by the Maine Central railroad; 730 sq. m.; pop. '90, 9511. It is a rough and cold region, not favorable to the growth of cereals. There are very large forests of sugar maple. Co. seat, Guildhall.

ESSEX, a co. in e. Virginia, bounded by the Rappahannock, which is navigable; 235 sq. m.; pop. '90, 10,047, includ. colored. The surface is uneven, and the soil for the most part sandy. Co. seat, Tappahannock.

ESSEX, a maritime county of the s.e. of England, having the North sea on the e., the Thames estuary dividing it from Kent on the s.; Middlesex and Hertford on the w.; and Cambridge and Suffolk on the north. Its greatest length from n.e. to s.w. is 63 m. and the greatest breadth from e. to w. is 54 m. It has 987,028 acres, most of its area being arable or in grass. The coast-line is 85 m. long. Some cliffs at the Naze are 35 ft. high. The center and n. of the county are beautifully diversified and richly wooded, the highest point being Langdon hill, 620 ft. above the sea, and in the s.w. is Epping Forest. Besides the Thames, the other chief rivers are the Stour, 50 m. long; Blackwater, 46 m.; Lea, Roding, Crouch, and Chelmer. The e. of the county is mostly on London clay, with limestone beds near Harwich. Pop. '91, 785,445.

ESSEX, a co. in the province of Ontario, Canada, between lakes Erie and St. Clair, traversed by the Grand Trunk and the Michigan Central railroads; 235 sq. m.; pop. '91, 55,545. Co. seat, Sandwich.

ESSEX JUNTO, a term used for the first time by a colonial governor of Mass. to designate a body of men from Essex co. which had arrayed itself against his corrupt policy. It was next employed by Gov. Hancock against certain conservative federalists of Essex co., who, 1781, nominated James Bowdoin as the representative of the traditional, as opposed to the popular, politics of the day. The most notable of this coterie were Theophilus Parsons, Stephen Higginson, Timothy Pickering, and George Cabot.

Pickering mentions in his diary that, although an Essex inhabitant, he never heard the term used until 1797, when John Adams spoke of such Mass. federalists as had been lukewarm in the campaign as members of the Essex Junto. It was a title invented by the opponents of conservative federalism; and although the men included in its ranks exercised a remarkable influence upon national politics, they never submitted to the charge of having formed a cabal or of starting any movement apart from the highest motives of statesmanship. Personally, they were of blameless character. See *Life and Letters of George Cabot*, by H. C. Lodge.

ESSEX, ROBERT DEVEREUX, EARL OF, son of Walter Devereux, first earl of E., was born at Netherwood in Herefordshire, 10th Nov. 1567; entered Trinity College, Cambridge, at the age of 10, where he remained for four years. Lord Burleigh, to whose guardianship he had been intrusted, introduced the handsome and gifted youth at court in 1584. Here, by his agreeable manners, his appearance, and talents, he established himself among troops of friends, and gained the special favor of Elizabeth. In 1585, he accompanied the earl of Leicester to Holland, where he distinguished himself at the battle of Zutphen, and on his return to England was made master of the horse and knight of the Garter. After the death of Leicester, E. continued to rise in the favor of Elizabeth, who loaded him with honors. In 1591, he commanded the forces sent to the assistance of Henry IV. of France against the Spaniards, but achieved no success. The next few years were spent in endeavoring to get the better of Burleigh—the wisest, the most prudent, and the most politic of all Elizabeth's advisers. In 1596, he was appointed joint-commander with lord Howard in the expedition against Spain, to which Burleigh was strongly opposed; and though E. displayed all his wonted courage, and contributed to the capture of Cadiz, which caused immense loss to the Spaniards, yet the expedition resulted in nothing, and E. had to defend himself against various accusations on his return. In 1597, he was made earl marshal of England, and, on the death of lord Burleigh, chancellor of Cambridge. In 1598 occurred the first fatal mistake in E.'s career. Presuming upon Elizabeth's admiration and feminine fondness for his person, he differed from her about some trifling matter, and angrily and rudely turned his back upon her in the presence of some of the council, and her majesty, whose language was hardly more delicate than her father's, gave him a vigorous box on the ears, telling him to "go and be hanged." A violent quarrel ensued, which, though apparently smoothed up, was never really so. E. was afterwards, in 1599, sent to Ireland—part of which at that time was in a state of rebellion—as lord-lieutenant of that country; but here his government was ill-advised and ineffectual, and after a few unimportant undertakings, he concluded a truce with the rebels, which was regarded at court as high treason. In order to confront his enemies, he hastened back to London, contrary to the queen's express commands, and forced his way into Elizabeth's bedchamber. Justly offended, the queen deprived him of his dignities, and commanded that he should be called to account for his behavior. E., advancing from one degree of foolhardiness to another, tried to excite an insurrection in London. He was imprisoned, tried, and found guilty. Elizabeth long delayed signing the warrant for his execution, in the hope that he would implore her pardon. He was beheaded on the 25th Feb., 1601, after defending himself with pride and dignity. E. was rash, bold, and presumptuous; but brave, generous, and affectionate, and the friend and patron of literary men.

ESSEX, ROBERT DEVEREUX, Earl of, 1591-1646. He was a companion of the prince of Wales. At the age of 15 he was married to Frances Howard, daughter of the earl of Suffolk, but nine years afterwards the marriage was annulled on account of the wife's intimacy with Rochester, earl of Somerset. A second marriage also ended unhappily. In 1620-23, he served in the wars of the palatinate, and in 1625 was vice-admiral of a fleet which made an unsuccessful effort to capture Cadiz. In 1639, he was lieutenant of the army sent against the Scotch covenanters; but no fighting was done. His summary dismissal made him an enemy of the king (Charles I.), and in 1642, he was commander of the parliamentary army. He won the battle of Edgehill, captured Reading, and relieved Gloucester; but in 1644, because of his unwillingness to fight the king in person, he lost nearly the whole of his army. In 1645, he resigned his commission, but was granted an annuity of £10,000 for his past services.

ESSEX, THOMAS CROMWELL, Earl of. See CROMWELL, THOMAS.

ESSIPOFF, ANNETTE, Russian pianist, b. in St. Petersburg in 1850. She received her musical education at the conservatorium in St. Petersburg, studying the pianoforte under Theodor Leschetitzky, to whom she was married in 1880. Mme. Essipoff has made numerous tours in Europe, and traveled in America, giving concerts with great success in 1876. She is one of the most brilliant pianists of the day.

ESSLINGEN, a manufacturing t. of Germany, in the kingdom of Württemberg, is situated near the right bank of the Neckar, in the center of a pleasing and fertile district, 7 m. e.s.e. of Stuttgart. It consists of the town proper, and five suburbs, and is surrounded by strong walls, and fortified by towers. The chief buildings are the *frauenkirche*—a splendid edifice in the purest Gothic style, built in 1440, surmounted by a spire 230 ft. high, and having five stained glass windows and three portals ornamented with excellent reliefs, the old and new town-houses, and the old castle. The church of St. Dionysius, a basilica in the transition style, stands in the market place, which also con-

tains St. Paul's church, in the early Gothic style. It has an important machine-making trade and a variety of manufactures, including a wine called Esslingen champagne. Pop. '95, 24,031.

ESSOUAN, or ESWAN. See ASSOUAN.

ESTABLISHED CHURCH, a church established and maintained by a state for the teaching of Christianity in a particular form within its boundaries. Subsequent to the reformation, many of the opinions which had given sanctity to the church of Rome still kept possession of men's minds; amongst these was the notion, that the civil government of each state was bound to maintain a particular form of Christianity. The same fallacious reasoning which in more recent times has led to the search for one absolutely best form of civil government was at work then with reference to the church. The Roman Catholic church was not the best form—of that the Protestant states had become convinced—but all forms were not therefore indifferent; and if one was better than another, and another better than that, there must be an absolutely best, which the state was bound to discover, and when discovered, to substitute for that which had been abolished. The idea that the good or bad qualities of forms of government, whether civil or ecclesiastical, so long as they did not violate the fundamental doctrines of Christianity or morality, were relative, and not absolute, and that whilst one might be the best for men in one stage of development or of one particular temperament, another might be the best for those who differed from them in these respects, did not belong to that age. Each Protestant state consequently established a church, conformity to the tenets of which it enforced, not only upon those who as ministers were henceforth to enjoy the property which in Roman Catholic times had been devoted to the spiritual interests of the community, but very often on its own civil servants and advisers. The benefit of the arrangement was, that, to a greater or less extent, the means which the community had set apart for its own spiritual improvement were protected from the spoliation of private individuals; and this benefit was secured more effectually the more completely the new church took the place of the old—in England, for example, better than in Scotland; but as each of the Protestant states had substituted one form of church-government for another, and as the same form had not been adopted by them all, the idea of there being one form which was absolutely preferable to the others, though not abolished, was rudely shaken. In England, queen Elizabeth had stated in her celebrated declaration, that she, as head of the church, “would not endure any varying or departing in the least degree” from the doctrines of the Episcopal church of England as set forth in the thirty-nine articles; and yet Presbyterianism was established in England in 1649. In Scotland, where Presbyterianism had at first taken root, Episcopalianism had more than once become the law of the land. The effect of such occurrences was to counteract the belief in any one form as the form for all Christendom, and to facilitate dissent and the formation of sects. The pastors of these sects were not at first recognized by the law as entitled to any of the privileges of Christian ministers. Whatever they might be to their own flock, to the state they were laymen, and their churches were mere secular lecture-rooms, or, at most, places of meeting for private devotion. See NONCONFORMISTS, DISSENTERS, CHURCH, etc. Gradually this view became modified, and the civil consequences attaching to sacred rites, when performed by a clergyman of the establishment, were extended to them when performed by dissenters. See MARRIAGE. But though many of the privileges, and all the liberties belonging to the established church, have now been extended to dissenting bodies, including Roman Catholics (see ROMAN CATHOLIC EMANCIPATION) and Jews (q.v.), the established churches of England and Scotland are supported by the state, and guarded from spoliation by the coronation oath (q.v.). The grant to the Roman Catholic college of Maynooth, and the *Regium Donum* (q.v.) to the Presbyterian ministers in Ireland, were capitalized by the act (1869) which disestablished the Irish church. There is no endowment to other religious denominations as in France; and the emoluments of the established church in England, though modified in their distribution by the labors of the ecclesiastical commissioners (q.v.), have not yet been appropriated to any other than religious uses in connection with that church.

The cause of established churches is very generally maintained on the ground of the alleged duty of the state to provide for the religious instruction of the whole body of the people, as most essential to their moral welfare, and so to the general prosperity of the community. It is further argued, in support of the same cause, that civil rulers, or the people as associated in a free state, are under a moral obligation of the highest kind, to acknowledge God, his law, and his ordinances. Concerning which, and other arguments, for and against established churches, as far as it belongs to the scheme of this work to notice them, the reader is referred to the article VOLUNTARIISM. It may here, however, be observed, that the arguments just mentioned do not necessarily infer, even when admitted to the utmost that the state is bound to support in any exclusive way a particular sect or denomination, unless on the further assumption that religious truth and worth belong to that denomination alone. Nor does the *endowment* of a church by the state necessarily follow from the fullest adoption of the principles thus contended for. And, on the other hand, it is a point which may very reasonably be disputed, how far the common arguments against state endowments are applicable to those endowments which were not originally bestowed by the state, but which the state has, from a

very early period, recognized as belonging to the church; a description which will be found to comprehend great part of the existing endowments of established churches.

ESTAFETTE, in Europe, an express for the conveyance of letters and small packages. The articles are consigned to the care of the postilions on duty along the route.

ESTAING, CHARLES HECTOR, Comte d', 1729-94; a French admiral, b. Auvergne. He first entered the army, and in 1757, as brig.gen., accompanied count de Lally to the East Indies. At the siege of Madras, 1759, he was made prisoner, but was released on parole. He at once resumed service in command of two ships of war, and being again taken captive in 1760, he was thrown into prison at Portsmouth for breaking his parole. He was soon released, and was appointed lieut.gen. in the navy in 1763, and in 1777 vice-admiral; and in 1778, commanded the fleet sent to aid the United States against Great Britain, bringing with him Gérard, the first French ambassador to the United States. He planned, with the American generals, a combined land and naval attack on Newport; and his demonstrations forced the British to burn or sink six frigates lying in the harbor; but lord Howe came, with an English fleet, to relieve Newport, and d'Estaing put to sea to engage him. A sudden storm separated the fleets, and d'Estaing put into Boston to repair his shattered ships. In Nov. he sailed to the West Indies, where he captured St. Vincent and Grenada, compelling the fleet which had come to relieve Grenada to retire to the harbor of St. Christopher. With 23 ships he co-operated, Oct. 9, 1779, in the unsuccessful attack on Savannah, and was himself wounded. The following year he returned to France. He commanded the combined fleet before Cadiz, when the treaty of peace was signed in 1783. Entering into French politics, he was elected to the assembly of notables in 1787, in 1789 he commanded the national guard, and in 1792 the national assembly chose him admiral. In 1793, he bore testimony in favor of Marie Antoinette. The following year he was himself brought to trial, condemned, and executed.

ESTAMINET (Fr.), a cheap coffee-house where smoking and liquor-drinking are allowed; a bar-room. "Frequenters of billiard-rooms and *estaminets*; patrons of foreign races and gaming-tables."—Thackeray. See CABARET.

ESTATE (Lat. *status*), in law, a term signifying, in its generic sense, the condition or circumstances in which an owner stands in regard to his property. In its more common and restricted sense, it is used to denote the *interest* which one has in lands, tenements or hereditaments. As thus employed, estates are divided, by the common law, with regard to their quantity into two general classes: (1) Estates of freehold and (2) Estates less than freehold. 1. A freehold estate is one for life or in fee. Life estates are either legal—*i.e.*, raised by operation of law, or conventional—*i.e.*, made by act, contract, or convention of the parties. The legal life estates are those held by courtesy (q.v.), dower (q.v.), or jointure (q.v.). Those that are conventional are made to last either for the life of the owner or for the life of some other designated person, or for an uncertain period which may continue during the life of the owner, such as an estate to a widow during her widowhood. Estates in fee, which are those of inheritance, are either fees-simple or fees-qualified. The fee-simple is the highest and most absolute estate, and is generally created or transferred, at common law, by the conveyance of real property to one and his heirs forever. The qualified fees are also created and transferred by the use of the word "heirs," but are restricted in some manner, so as not to give an absolute ownership. Thus, an estate to A and the heirs of *his body* gives him a fee-tail; an estate to A and his heirs, provided that intoxicating liquors shall never be sold upon the premises, gives him a fee upon condition, and an estate to A and his heirs, so long as they shall live in a designated place, gives him a fee upon limitation. 2. Estates less than freehold are either for years, or from year to year, or at will, or by sufferance. These are called chattels real, are personal property, and will be explained under LANDLORD AND TENANT (q.v.). With regard to the number and connection of their owners, estates are (1) Estates in severalty, or those in which each estate has only one owner; (2) Estates in joint-tenancy, or those held jointly by two or more persons in equal shares by purchase, and in such manner that, if one or more owners die, the entire ownership devolves upon the survivor or survivors; (3) Estates held by tenancy in common, or those of which two or more owners have undivided portions, but in such manner that, if one die, his right does not pass to his surviving co-tenants; (4) Estates in coparcenary, or those common law estates which descended upon two or more females upon the death of an intestate ancestor; and (5) Estates by entirety, or those held by husband and wife as such, in such manner that, on the death of either, the entire property belongs to the survivor and neither alone can convey any interest in the property so as to cut off such right of survivorship. Estates are also divided into legal and equitable, the latter including uses and trusts; and again into estates in possession and estates in expectancy, the latter including reversions, remainders and executory interests.

ESTATE, in a political sense, is a distinct class or order in society. The three estates under the feudal system were nobles, clergy, and commons. The feudal theory was that the basis of all power was property in land, and the clergy held their position in the feudal order by virtue of their landed proprietorship. The ambiguous position of the greater ecclesiastics as suzerain lords over territories, and at the same time spiritual ministers, led to the "war of investitures." Gregory VII. aimed to free the clergy from the duty of feudal homage to the secular prince. The result was the sepa-

ration of the two investitures, and a sharp distinction between spiritual and secular power. As the lay rulers grew stronger, the temporal authority of the clergy declined, until, at the present time, they form rather a corporation than a class. The history of the middle ages is a record of the rise of the "third estate." They were the representatives of the merchant class, the *bourgeoisie*. They first arose to prominence in the free cities of Italy and of the Hanseatic league. In Spain and England, especially, the absolute power of the crown was the product of the alliance of king and third estate as against the nobles. Before the "Union" (1707) the term "Estates of the Realm" was used in Scotland as equivalent to "Parliament." The States General of France, composed of the three estates, was seldom convened. At the outbreak of the Revolution the summoning of this body was resorted to when all other expedients failed. The old established custom was to vote by orders, but the third estate would thus have been outvoted in the new assembly. Its members determined to introduce the new principle of voting individually. In this they succeeded, and, with their success and the reorganization of the National Assembly, the French Revolution may be said to have begun. The term "fourth estate" is often applied to the press. Its first use in that sense is attributed by Carlyle to Edmund Burke, who pointed to the reporters' gallery in the house as containing a fourth estate more powerful than the other three.

ESTATE TAIL. See **ENTAIL**.

ESTÉ (ancient *Ateste*), a t. in the Italian province of Padua, situated on the southern slope of the Euganean hills, 15 m. s.s.w. of Padua. Pop. about 10,000.

ESTÉ, one of the oldest and most illustrious families of Italy, which, according to the historian Muratori, owed its origin to those petty princes who governed Tuscany in the times of the Carolingians, and who were in all probability of the race of the Longobards. The first whose figure is more than a mere shadow is Adalbert, who died about 917 A.D. The grandson or grand-nephew of Adalbert, named Oberto, was one of the Italian nobles who offered the crown of Italy to Otho of Saxony. He is afterward styled *Comes sacri palatii*, and appears to have been one of the greatest personages in the realm; he married a daughter of Otho's, and died about 972 A.D. In later times, the family of E. received from the emperors several districts and counties, to be held as fiefs of the empire. The family divided, at an early period, into two branches, the German and Italian. The former was founded by Welf or Guelfo IV., who received the investiture of the duchy of Bavaria from the emperor Henry IV. in 1070. The houses of Brunswick and Hanover, and consequently the sovereigns of Great Britain, also called Este-Guelfs, are descended from this person. In the 12th, 13th, and 14th centuries, the history of the E. family, as heads of the Guelf party, is interwoven with the destinies of the other ruling families and small republics of northern Italy. During this period, they first gained possession of Ferrara and the march of Ancona (1208 A.D.), and afterwards of Modena and Reggio (1288-89), and were widely celebrated as the patrons of art and literature. One of the most illustrious was Azzo VII., who encouraged Provençal troubadours to settle at his court at Ferrara, and also founded schools in that city. Alfonso I. (d. 1534) was equally distinguished as a soldier and a statesman, and was celebrated by all the poets of his time, particularly by Ariosto. His second wife was the notorious Lucrezia Borgia. His quarrel with the popes Julius II., Leo X., and Clement VII., was unfortunate, as an interdict was laid upon him for his adherence to the league of Cambray, and his papal fiefs declared to be forfeited. After the siege of Rome, in 1527, the duke was restored to his former possessions by Charles V. His successor, Ercole or Hercules II., who married Renate, daughter of Louis XII of France and Anne of Brittany, attached himself to Charles V. He and his brother, a dignitary of the Catholic church, were also liberal patrons of arts and sciences; the latter erected the magnificent villa d'Este at Tivoli. The next prince, Alfonso II. (d. 1597), would have been no ways inferior to the preceding but for his immoderate love of splendor, his inordinate ambition, and the cruelty he displayed toward the poet Tasso, whose eccentricities, however, it must be confessed, were enough to try the patience of any reasonable mortal. Alfonso IV., who flourished in the latter half of the 17th c., was very fond of the fine arts, and founded the Este gallery of paintings. *Rinaldo* (d. 1737), by his marriage with the daughter of the duke of Brunswick-Lunenburg, united the German and Italian houses, separated since 1070. The male line of the house of E. became extinct on the death of Ercole III. in 1803, his possessions having been previously seized by the French invaders, and annexed to the Cisalpine republic. His only daughter married the archduke Ferdinand, third son of Francis, emperor of Austria. Their eldest son, Francis IV., by the treaty of 1814-15, was restored to the territories which had belonged to his maternal ancestors, comprising the duchy of Modena; and, on his mother's death, obtained the duchies of Massa and Carrara. He was succeeded by his son, Francis V., 21st Jan., 1846. The connection which the family of E., like others of the small Italian principalities, had formed with Austria, gave it, of course, pro-Austrian sympathies, the result of which has been fatal to its popularity and dynastic existence. In 1860, the sentiment of Italian unity and independence, which for the previous 15 or 20 years had been steadily fostered by the policy of Sardinia, triumphed in a universal explosion of national feeling, which united the peninsula (with the exception of Rome and Venice) under the authority of Victor Emmanuel. Venice was added to the kingdom of Italy in 1866, and Rome became the capital in 1870.

ESTELIA, an ancient city of Spain, in the province of Navarre, is pleasantly situated on the left bank of the Ega, about 20 m. s.w. of Pamplona. It is a well-built, clean town, with several squares, and has, in the environs, a variety of agreeable promenades and pleasure grounds. It has two interesting churches, both old, and one of them, San Juan, a fine building with a very lofty tower. The manufactures are woolen and linen fabrics, brandy, and earthenware. A tolerable wine is made in the vicinity. E. has some trade in fruits, wool, hardware, and grain. Pop. about 6,000. Here Don Carlos was proclaimed king in Nov. 1833; and at E., again become a Carlist stronghold, battles were fought in 1874 and 1875.

ESTEPA, a t. of Spain, in the province of Seville, and 60 m. e.s.e. of the town of that name. It is, on the whole, well built; has several squares, and numerous religious edifices, among which are the churches of Santa Maria and San Sebastian. Pop. '87, 9059.

ESTEPO NA, a maritime t. of Spain, in the province of Malaga, and 25 m. n.n.e. of Gibraltar. It is well and regularly built. Pop. '87, 9771.

ESTERHAZY. See *ESZTERHAZY*.

ESTHER (the word signifies "the planet Venus") is the Persian name of Hadassah, daughter of Abihail, the son of Shimei, the son of Kish, a Benjamite. She is represented in Scripture as an orphan, and as having been brought up by her cousin Mordecai, an officer in the household of the Persian monarch Ahasuerus. Her history, as recorded in the book of E., is well-known and extremely interesting. When the misconduct of Vashti had cost her her "royal estate," all "the fair young virgins" of the kingdom were gathered together, that Ahasuerus might choose a successor. He selected Hadassah, who received the name of E. on account of her loveliness. The great event of her life was the saving of her Jewish countrymen from the horrors of that universal massacre planned by the malice of Haman, and consented to by the thoughtless cruelty of an oriental despot. The details of this event are too familiar to require narration. It is sufficient to say that E.'s success was signal; and the feast which she and her cousin Mordecai appointed in memory of their deliverance—viz., the feast of Purim (i.e., of Lots), is, in consequence, celebrated with great enthusiasm. E. is not mentioned in profane history, whence it has been inferred by some that she was not exactly the *wife* of Ahasuerus (Xerxes), but rather the favorite of his harem, to which she undoubtedly belonged; for, as we read (ii. 8), E. was consigned "to the custody of Hegai, keeper of the women." This hypothesis is rendered probable by the fact, that the Persian kings did not choose wives from their harem, but from the principal Persian families, or else from the daughters of foreign potentates.

ESTHER, BOOK OF, one of the very latest of the canonical works of the Old Testament, and commonly, but without a shadow of evidence, supposed to be written by Mordecai or Ezra. This is the view of Abenesra, Clement of Alexandria, Augustine, Gerhard, and others. The Talmud assigns the authorship to the members of the great synagogue, a semi-mythical body, who are made use of by Jewish rabbis and Christian divines as a sort of *Deus ex machina* to solve every difficulty. According to the opinions of the most learned and unprejudiced critics, the date of its composition must be placed after the downfall of the Persian monarchy. The language is much later than that of Ezra and Nehemiah, and the fact of occasional explanation of Persian customs fits the period of the Seleucidæ better than an earlier one. The Hebrew text is that which has been followed in the English version; but the Septuagint is full of late interpolations and additions by Alexandrian Jews. The book is held in the highest reverence by the Jews; so much so, that Maimonides declared that, in the days of the Messiah, every Jewish scripture would be forgotten except the book of Esther and the Pentateuch. The book is not written in a theocratic spirit, like the rest of Jewish literature. Nothing is directly attributed to God; in fact, his name is not once mentioned. Neither is there the remotest trace of religious feeling of any kind. Luther, in his usual off-hand hasty way, expressed his contempt for the book, in spite of the admiration which the Jews bestowed on it, censuring it for its "heathenish extravagance," and declaring that, in his judgment, it was "more worthy than all of being excluded from the canon." The absence of all recognition of God, perplexed some of the ancient Jewish commentators, who therefore invented the hypothesis, that the book was originally a part of the Persian chronicles, probably executed by Mordecai; and that, being intended for the heathen, the sacred name was wisely left out!

ESTHER, APOCRYPHAL BOOK OF. The Apocryphal Book of Esther consists of the canonical Book of Esther (q.v.) with some interpolations, and six chapters added at the end. It is worth noting that these chapters are found in the Septuagint version, but not in the Hebrew. Jerome placed all the additions as a sort of appendix to the Book of Esther; and they were not formally inserted among the Apocrypha until the time of Martin Luther, in whose version they were so classed. They are still accepted as canonical by the Roman Catholic Church and by the Greek Church. See *APOCRYPHA*.

ESTHONIA, called by the inhabitants themselves *Wiroma* (i.e., the border-land), a Russian government, and one of the Baltic provinces (q.v.) extends immediately s. of the gulf of Finland; has an area of 7818 sq.m., and a pop. (1892) of 406,819. It was

conquered (1182-1241) by the Danes, who sold it to the Teutonic knights in 1346. It came into the possession of the Swedes in 1561, but was taken from them by Peter the Great in 1710; and by the treaty of Nystadt was finally secured to Russia in 1721. The surface is in general flat, and the part which is under cultivation produces potatoes, rye, and barley; the rest is chiefly composed of sandy tracts and marshes, strewn in many places with large blocks of granite; there are also extensive forests of birch and pine. The government of E. is divided into four circles; its principal town is Reval or Revel (q.v.).

The population consists mainly of Esthonians, but in the towns the predominant element is German, and there are also Swedes and Russians. The Esthonians belong to the Finnish race, and are the original possessors of the soil. Their language is soft and musical and is divided into two leading dialects, that of Reval and that of Dorpat. They also possess a literature rich in splendid national songs. See Neus, *Esthonische Volkslieder* (Reval, 1830-51). They are industrious, kind-hearted, and in the main religious and attached to the Protestant doctrines. A great part of Livonia is peopled with Esthonians, who also are found in the provinces of Pskov and St. Petersburg, and have colonies in east Russia and Siberia.

ESTIENNE, or **ETIENNE**. See **STEPHENS**.

ESTILL, a co. in central Kentucky, divided into nearly equal parts by Kentucky river; 250 sq.m.; pop. '90, 10,836, inclu. colored. It has abundant water-power, and mines of iron and coal, with hilly but fertile soil. Co. seat, Irvine.

ESTOC (Italian), a small dagger worn at the girdle, called in Elizabethan times a tucke.

ESTOILE, or **STAR**, in heraldry, differs from the mullet (q.v.) by having six waved points; the mullet consisting of five plain points.

ESTOPPEL, an impediment or bar to a right of action, arising from a man's own act. It is called an E. or conclusion, because a man's own act or acceptance stoppeth or closeth up his mouth to allege or plead the truth.—*Co. Litt.* 352 a. Estoppels are of three kinds—1. By matter of record, where any judgment has been given in a court of record, the parties to the suit are estopped from afterwards alleging such matters as would be contradictory to the record. 2. By matter in writing. Thus, a party who has executed a deed will be precluded from afterwards denying, in any action brought upon that instrument, the fact of which it is evidence. 3. By matter in *pays*, as by livery, by entry, by acceptance of rent, etc.—by any of which acts a man is barred from pleading anything to the contrary. The principle of estoppel is that what a man has once solemnly alleged is to be presumed to be true, and therefore he should not be suffered to contradict. The doctrine of estoppel prevails in America as well as in England. In Scotland also, the same principle is recognized, under the name of personal exception (q.v.).

ESTOVER (Fr. *estoffer*, to furnish), an incident to the estate of a tenant for life or for years. It is the right which the tenant has to make use of the wood on the estate for certain definite purposes. Estovers, or *botes* (Saxon), are of three kinds—housebote, which is twofold—viz., *estoverium edificandi et ardendi*, a right to wood for fuel and repairs of the house, ploughbote, *estiverium arandi*, wood for plows and carts; and haybote, *estiverium claudendi*, wood for repairing hedges and fences.—*Co. Litt.* 41 b.

ESTRAYS, or **STRAYS**, domestic animals found wandering about without apparent home or known owners. In England the owner has a year and a day in which to claim such cattle, and the proprietor of the inclosure where they are found must make proclamation in a church and in market-towns. When these conditions are fulfilled they belong to the proprietor of the inclosure. The law of estrays varies in the different states of the American union. In some, after an estray has been advertised and kept for a certain time it is sold to pay the charges of advertising and keeping, any balance going to the town treasury. Cattle at large contrary to regulations, or breaking into growing crops and doing damage, can in most states be sent to a pound, and after a short time sold to pay damages and expenses.

ESTREAT (Lat. *extractum*), in English law, a true extract copy or note of some original writing or record, and specially of fines or amercements, as entered in the rolls of a court, to be levied by bailiffs or other officers. When, however, it is applied to a recognizance (q.v.), it signifies that the recognizance itself is estreated, or taken out from among the other records, and sent to the exchequer.—Blackstone, *Comm.* iv. 253. If the condition of a recognizance be broken, the recognizance is forfeited; and on its being estreated, the parties become debtors to the crown for the sums in which they are bound.—Archbold, *Crim. Practice*, 78. The court of exchequer has power over penalties and forfeitures incurred at assizes, and can discharge or compound them at its discretion; but that court has no power over recognizances forfeited before justices of the peace.

ESTRÉES, **GABRIELLE D'**, 1571-99; a beautiful French girl who, at the age of 16, became a favorite of Henry III. and about the same time of Cardinal De Guise and the dukes of Bellegarde and Longueville. In 1590 she met Henry IV. soon after his great

victory at Ivry. He became desperately enamored, but she did not immediately discard her old lover, the duke of Bellegarde. Henry gave her a husband in one M. de Liancourt, but soon afterwards divorced them and raised her to the rank of marchioness, and in 1595 to duchess of Beaufort. Henry lavished riches upon her, and when she died she was the owner of a dozen estates near Paris. The king desired to divorce his lawful wife and marry her, but Sully had sufficient influence to delay the matter until the death of Gabrielle. This event happened suddenly, and not a few persons suspected foul play. She had borne the king three children.

ESTRÉMADURA, next to Alemtejo the largest province of Portugal, has an area of 6876 sq. m., and, including the capital, Lisbon, contained, in 1890, 1,091,401 inhabitants. The greater part of the country is billy, but the hills do not attain any great elevation. To the w. of the estuary of the Tagus are the granite mountains of the Serra da Cintra, varying from 1500 to 1800 ft in height, and terminating in the Cabo de Roca. To the s. of the Tagus are barren moors, partly broken by morasses, and the limestone chain of Arrabida, rising to a height of 1000 ft. and terminating in the Cabo de Espichel.

ESTRÉMADURA, previous to the new distribution of the country, a province of Spain, situated between Portugal and New Castile, and watered by the Tagus and the Guadiana. It is bounded on the n. by Leon, on the s. by Andalusia, and, since 1833, has been divided into the two provinces of Badajoz and Cáceres. It has an area of 16,554 sq. m., and contained, in 1886, 799,659 inhabitants. Although a continuation of the high table-land of New Castile, E. is not, like it, a uniform plain, but is mountainous on the n. and s., and is well watered, the slopes of the hills being covered with wood, and the valleys with rich grass. Notwithstanding the fertility of the soil, the land has lain desolate and uncultivated since the expulsion of the Moors in the 13th century. This is chiefly to be attributed to the Mesta, or right of pasture, which causes the land to be regarded as the common property of the possessors of flocks. The breeding of goats, swine, horses, asses, and mules is much attended to. Silk and honey form no inconsiderable branches of trade. Corn is still imported. Copper, lead, silver and coal are found, but the mineral resources of the region are not developed. Commerce is confined almost entirely to a contraband trade with Portugal. The inhabitants are poor, and, from the want of roads, isolated from the rest of Spain, and consequently in a low state of civilization. They make excellent soldiers, however, and have produced a series of brave *conquistadores* and generals.

ESTREMOZ, a fortified town of Portugal in the province of Alemtejo, is 23 m. n.e. of Evora, and about the same distance e. of Elvas. It is built round the base of the hill on which its once formidable castle, erected in 1360, is placed. It now ranks as the fourth or fifth stronghold in Portugal. E. is famous for its manufactures of earthenware; its jars, which are made of a porous clay, and have the property of keeping water singularly cool, are of elegant shape, and are used all over the peninsula. The earthenware manufactures of E. seem to have continued unchanged since Roman times, as until the present day the forms into which the jars are cast are purely classical. In the neighborhood of E. is a marble quarry. Pop. about 7300.

ESTUARY. (Lat. *aestus*, the swell of the sea.) This word formerly denoted that part of the sea-coast which is covered during flood-tide but at ebb-tide is left a low bed of mud. As a modern geographical term, it denotes the enlargement of a river channel towards its mouth, in which the movement of the tides is prominent. Among the principal estuaries may be mentioned the entrance to the St. Lawrence river, that of the Rio de la Plata, the Thames in England, the Elbe in Germany, and the Gironde in France.

ESZEK, a royal free town of Slavonia, on the right bank of the Drave, 12 m. above its confluence with the Danube, is the administrative capital of the "Kingdom," and the most prosperous trading-town of Slavonia. Since the Drave began to be navigated downwards to E. by steamers, the town has driven a prosperous trade in corn, wool, pigs, iron, deals, wine, and flax. The fortress of Eszek, known in Roman times under the name of Mursia, is protected by a fort situated on the left bank of the Drave. In the fortress, the commander's dwelling and the town-house, and in the lower town the county buildings, are specially worthy of mention. During the Hungarian revolution, the town was at first held by count Casimir Batthyányi, but capitulated, after a siege of several weeks, to the Austrian general, Baron Treubersberg. Pop. '90, 19,778, a large part of whom are Roman Catholics, the rest being Greek Catholics, Protestants, and Jews.

ESZTERHÁZY, an ancient family of Hungary, afterwards raised to the rank of princes, and at present one of the richest and most powerful of the noble families of Hungary. In 1238 the family divided into the two branches of Zerhaz and Illeshazy. The male line of the latter became extinct upon the death of Count Stephen in 1838. The former received from the Emperor Sigismund, the Galanta estates in the county of Pressburg. The succeeding ruler, Francis IV., ennobled the three now extant lines, Csesznek, Zolyom or Altsohl and Fraknó or Forchtenstein, which were raised to the countship in the 17th century. The most important member of this house was NIKOLAUS (1582-1645), Palatine of Hungary, and belonging to the catholic and Legitimist party. The Fraknó branch further divided into the von Fraknó and Pápa branches, which in 1687 received the princely dignity from Leopold I. The counts of E. consist at present of

three lines, Forchtenstein, of the Pápa branch; Hallewyl, and Altschl. The most important members of the family are:—

ESZTERHÁZY, MORITZ, count of, 1807-1890, an Austrian diplomat, until 1856 Austrian ambassador to Rome, became a member in 1861 of the Schmerling cabinet, and a member of the Belcredi ministry, formed in 1865. He was prominent in the reaction party at the court of Vienna.

ESZTERHÁZY, PRINCE NIKOLAUS, count of Edelstetten, 1817-1894, hereditary prince of Forchtenstein, member of the Hungarian ministry, royal chamberlain and major in the army, married, in 1842, lady Sarah Frederica Caroline, daughter of George Child Villiers, earl of Jersey.

ESZTERHÁZY, NIKOLAUS IV., Prince Eszterházy of Galanta, 1765-1833. He traveled all over Europe in his youth, resided for a considerable time in England, France, and Italy, served in the Austrian army, and rose to be general, and later was prominent in diplomatic offices. He founded a splendid collection of pictures at Vienna, and also made a choice collection of drawings and engravings. When Napoleon, in 1809, entertained the notion of weakening Austria by the separation of Hungary, he made overtures to prince E. respecting the crown of Hungary, which, however, were declined. The great Haydn composed most of his works at the court of prince Nikolaus.

ESZTERHÁZY, PAUL ANTON, Prince Eszterházy of Galanta, 1786-1866. He was Austrian ambassador in Dresden in 1810, in Rome in 1814, and afterward minister in London until 1842. In the Hungarian uprising of 1848, he was minister of foreign affairs. After the suppression of the revolution he retired from public life. In 1856 he went as Austrian ambassador to the coronation of Alexander II. in Moscow.

ESZTERHÁZY, NIKOLAUS JOSEPH, Prince Eszterházy of Galanta, count of Forchtenstein 1714-1790, grandson of Paul IV., privy counselor and field-marshal, was ambassador to several courts, and distinguished himself in the war of the Austrian Succession, in 1745, at the head of 12,000 men in Silesia, and in 1757 at Kolin, and was made commander of the Order of Theresa, and in 1768 field-marshal, and is known also as a patron of the arts and sciences. Pleyel and Haydn were pupils in the musical conservatory founded by him in Eisenstadt.

ESZTERHÁZY, PAUL IV., Prince Eszterházy of Galanta, count of Fraknó and Beregh, 1635-1713. He was an Austrian field-marshal and was prominent in the Turkish war, particularly in the battle of St. Gotthardt, 1664. In 1681 he was elected Palatine of Hungary, and later overthrew the Tökölys party. He took part in the liberation of Vienna 1683, and aided in driving out the Turks from Ofen in 1686, and contributed to the strengthening of the Habsburg power in Hungary, for which he was raised to principedom, and later was given the right to coin money with his own likeness on it. He was also a prince in the Roman Empire.

ÉTAH, a district in British India, included in the division of Agra, s. of the Ganges; between 27° 20' and 28n., and 78° 30' and 79° 20' e.; 1741 sq. m.; pop. '91, 702,000. It is chiefly an elevated alluvial plain, with some fertile land. The productions are wheat, barley, cotton, sugar-cane, opium, indigo, etc. There are two harvests in the year. The manufacture of indigo is a leading industry. This region was the seat of a primitive Aryan civilization. Its capital is E. with a pop. '91, of 7800.

ÉTAMPES (anc. *Stampœ*), a t. of France, in the department of Seine-et-Oise, is situated 32 m. s.s.w. of Paris, on the Orleans railway. It consists mainly of one street, about 4 m. long. The chief buildings are the ecclesiastical edifices. E. possesses a public granary, and in and around E. there are numerous flour-mills, constantly employed in providing for the Paris market; there are various manufactures in the town; and considerable quantities of garden-stuff are sent from this neighborhood to the capital. Pop. '91, 8573.

ÉTAMPES, ANNE DE PISSELEU, Duchesse d', 1508-76; mistress of Francis I. of France, over whom she had very great influence. But she was exceedingly jealous of Diana of Poitiers, the mistress of the dauphin (afterwards Henry II.), and under this passion betrayed state and army secrets to Charles V. After the death of Francis she was banished from court.

ÉTANG DE BERRE, a salt lake of France, in the s. of the department of Bouches-du-Rhône, communicates with the sea by a narrow channel, called Tour-le-Bouc, and is 11 m. long by 9 broad at its widest part. This lake contains great quantities of eels and other fish. Salt-works are in operation on its banks.

ETAWAH, a t. of the Doab, stands near the left bank of the Jumna, about 70 m. below Agra, in lat. 26° 46' n., and long. 79° 4' east. Though it is, on the whole, a dreary and mean place, yet it presents some remains of ancient grandeur, more particularly many of those ghats or flights of stairs which facilitate the approach to the river for the purpose of ritual ablution. It contained (1891) 38,800 inhabitants; and its prosperity, such as it is, is owing chiefly to its position at the junction of the two roads which lead to Agra from Cawnpore and Calpee.

ETA' WAH, or **ITAWA**, the district of which the above town is capital, belongs to the lieutenant-governorship of the North-west Provinces. It lies entirely in the basin of the Jumna and almost exclusively within the Doab, stretching in n. lat. from 26° 21' to 27° 9', and in e. long. from 78° 46' to 79° 49', and containing 1691 sq. m., and (1891) 728,000 inhabi-

tants. The district was at one time famous for the murderous fanaticism of the Thugs, 67 corpses of their strangled victims having been found in the wells during a single year.

ETCHING. See **ENGRAVING**.

ETCHING UPON GLASS. See **GLASS**.

ETCHEMINS, formerly an Indian tribe in Maine, now represented by the Penobscots and the Passamaquoddies. They dwell between the Micmacs and the Abenakis tribes. There are about 1000 still left. Nearly all are Roman Catholics.

ETCHMIADZIN', **EDCHMIADZIN**, or **ITSMIADZIN**, a t. and monastery in the Russian government of Erivan, famous as the seat of the catholicus, or primate of the Armenian church. It is situated in the plain of the Aras or Araxes, about 2,985 ft. above the sea, 12 m. w. of Erivan, and 30 m. n. of Mt. Ararat. The monastery comprises an extensive complex of buildings, and is surrounded by brick walls 30 ft. high, which, with their loopholes and towers, present the appearance of a fortress. Its architectural character has been considerably impaired by additions and alterations in the modern Russian style. The cathedral is a small but fine cruciform building, with a Byzantine cupola at the intersection, a large tower at the western end, and a smaller tower above each wing of the transepts. It is here that the catholicus confers episcopal consecrations by the sacred hand of St. Gregory; and here every seven years he prepares with great solemnity the holy oil which is to be used throughout the churches of the Armenian communion. The library of the monastery is said at one time to have contained 15,000 volumes, and in spite of depredation and neglect, it still remains a rich storehouse of Armenian literature. Among the more remarkable manuscripts are a copy of the Gospels in a massive binding of carved ivory, dating from the 10th or 11th c., and three Bibles of the 13th c., one of which had belonged to Aytoun II., king of Armenia. To the e. of the monastery is a college and seminary of modern erection. At the distance of about half a mile stand the churches of St. Rhipsimé and St. Gaiana, two of the early martyrs of Armenian Christianity; the latter is of special interest as the burial-place of all those primates who are not deemed by the synod worthy of interment beside the cathedral. The town of Etchmiadzin, or as it should be called Vagharshapat, contains about 3,000 inhabitants, but has long ceased to be of any individual importance. According to Armenian historians, it dates from the 6th c. B.C., and takes its name from king Vagarsh, who, in the 2d c. A.D., chose it as his residence and surrounded it with walls. According to the legend, the great apostle of Armenia, St. Gregory the illuminator, having seen the Savior descend in a flood of light in the neighborhood of the palace, was ordered by an angel to erect a church on the spot. He observed the divine command in 309, and gave the building the commemorative name of "Edch-Miadzin," or "Descended the Only Begotten." In the Russo-Persian war of 1827, though the monastery was declared neutral territory by both belligerents, it was occupied by Russian troops.

ETEOCLES AND POLYNICES, sons of Œdipus and Jocasta, cursed by their father for shutting him up in prison. In order to prevent the fulfilment of his prediction that they would engage in fratricidal strife for the throne, they agreed to reign on alternate years. Eteocles, the elder, began, but when his year was up he refused to vacate. Then Polynices, resolved on revenge, fled to the court of Adrastus, king of Argos, whose daughter he married, and whom he induced to join his side in a war against Thebes. This expedition is known as "The Seven against Thebes," from the number of the chiefs who headed it, and is said to have occurred 27 years before the Trojan war. Eteocles and Polynices fought in single combat and both were killed. Of the seven leaders of the attacking force, Adrastus alone survived. Ten years after the close of the war, the fight was renewed by the descendants of the Argive chiefs who had been killed, this latter war being known as that of the Epigoni (descendants). The story forms the basis of *The Seven against Thebes* by Æschylus, and the names of the seven chiefs are mentioned by Sophocles, in his *Œdipus Coloneus*, and by Euripides in his *Suppliants* and *Phœnissæ*.

ETERNAL PUNISHMENT. See **ESCHATOLOGY**; **HELL**; **IMMORTALITY**.

ETESIAN WINDS (Gr. *έτος*, year), a name applied by the Greeks to particular winds that blew from the n. every year. Arising on the setting of the dog-star, they continued forty days. Arrian gives the same name to winds that blew from the s. across the Indian ocean.

ÉTEX, ANTOINE, b. Paris, 1808; a sculptor, pupil of Dupaty, Pradier, and Ingres. He traveled in Italy, Algiers, Germany, and England. He excelled in painting as well as sculpture, and published works on the two arts. He d. 1888.

ETH'ELBALD, d. 860; King of Wessex; son of Ethelwulf, king of the Anglo-Saxons. Ethelbald formed a conspiracy to seize his father's throne, but was dissuaded on being given the rule of Wessex only. He married his young stepmother, Judith, daughter of the king of France, but the displeasure of the church and of the people compelled them to separate, and she went into a French convent, from which she eloped with Baldwin of the Iron Arm, and from their union came Matilda, wife of William the Conqueror. The reign of Ethelbald was uneventful.

ETH'ELBERT, King of Kent, and fourth in direct descent from the great Hengist, was b. in the year 552, and succeeded to the throne in about the eighth year of his age. The representative of the first Saxon king who ruled in England, and envious on that account of the title of Bretwalda, then enjoyed by Cealwin of Wessex, E. rashly undertook an expedition against that king in 568, a venture which, had he known the

extent of country covered by the West Saxons, he would probably never have made. The rival kings met at Wibbandune, now Wimbledon, in Surrey, where a great battle took place, resulting in the defeat of Ethelbert. This is recorded as being the first battle that ever occurred between Anglo-Saxon sovereigns. Taught by disaster and danger, E. became more prudent. His subsequent schemes were more successful, and, about the year 590, he was acknowledged as Bretwalda of the Saxon octarchy, a dignity which he maintained to the close of his reign and life. In 570, E. married Bertha, a Frankish princess. The lady was a Christian, and it is said had stipulated, as a condition of her marriage, that she should be allowed, after her arrival in Kent, to practice her own religion. Her amiable piety had completely disarmed E. of all violence against the Christian religion long before the most important event of his life took place, viz., the formal introduction of Christianity into his kingdom. This was effected by means of the ministrations of St. Augustine, who was sent to Britain by pope Gregory, and who landed in Kent in 596. In the following year the king himself was converted, and Christianity established among the hitherto pagan Saxons. After his conversion and baptism, he founded the bishopric of Rochester, and, in concert with his nephew Sebert, king of Essex—who also had been converted—erected the church of St. Paul's in London. He died in 616.

E. is also distinguished as the author of the first written Saxon laws. These are the *Dooms*, as they are called by Bede, "which he established with the consent of his Witan in the days of St. Augustine." They are in the Saxon language, and are the earliest written laws that exist in any modern tongue.

ETHELBERT, d. 866; King of the Anglo-Saxons. He was a son of Ethelwulf and ruled all the kingdom except Wessex, succeeding to that portion also on the death of his brother Ethelbald in 860. It was during Ethelbert's reign that the Northmen, under the famous Ragnar Lodbrok, ravaged Kent, sacked the city of Winchester, and threatened London.

ETHELRED, or **ÆTHELRED**, I., d. 871; King of the Anglo-Saxons, succeeding his brother Ethelbert. He assumed the rule in 866, and his short reign was greatly disturbed by the forays of the Northmen under the sons of Ragnar Lodbrok. Ragnar had been captured and thrown into a den, where he was stung to death by serpents. His sons vowed vengeance. They seized the city of York and killed the princes who had captured their father; passed the winter in Nottingham, marched into East Anglia, destroyed several monasteries and nunneries, and killed Edmund, the king of East Anglia, of whom the church made a martyr. They were at last defeated by Ethelred, assisted by Alfred (afterwards the great), but two weeks afterwards they defeated Ethelred and Alfred at Basing. Ethelred died of a wound and Alfred became his successor.

ÆTHELRED, or **ÆTHELRED**, II., **THE UNREADY**, 968–1016; King of the Anglo-Saxons; son of Edgar and Elfrida. Careless of everything save his immediate comfort or whim, he and his kingdom were managed by unworthy favorites. In his time the Danes made many conquests in England, and forced Ethelred to purchase peace, to do which he laid upon his people the oppressive tax known as the "Danegeld," which was enforced at times for nearly 200 years. The Danes ravaged all the country around the river Humber, and in 994, aided by Olaf king of Norway, they laid siege to London, but the city was saved through the valor of its people. The Northmen then attacked the southern coasts, but they were hindered by the defection of Olaf, who embraced Christianity and became Ethelred's ally. In the last three years of the 10th c., the Danes ravaged Kent, Sussex, and Wessex. In 1000 the Anglo-Saxon king, disregarding the enemy at home, invaded Normandy, where he was disastrously defeated; but he made a treaty, and married Emma, the daughter of the duke of Normandy. In the spring, he concluded a treaty with the Danes; but, on pretense that they were plotting treachery, the next winter he ordered the murder of all the Danes in England. Among the victims was Gunold, sister of Swend, king of Denmark. Swend was swift in his revenge, and for four years his army ravaged almost at their pleasure in England. In 1007, Ethelred again bought peace for a large sum of money. In 1009, Ethelred collected the "largest fleet that had been seen in the reign of any king," with the intention of driving the Danes from the sea; but the fleet was almost wholly destroyed by a storm; the Danes renewed their ravages, and the English suffered many defeats, until another peace was purchased for money in 1012. The next year Swend, with the largest fleet he had ever collected, sailed up the Humber and marched towards London; but he met such strong resistance that he gave up the plan of attacking the city, and turned off to Bath, where he was proclaimed king of England by the people, who were weary of Ethelred's incompetency and exactions. London soon acknowledged Swend, and the deposed Anglo-Saxon king fled to Normandy. Swend died in the spring of 1014, and Ethelred was re-called on promising to rule better in the future. In the same year he defeated Cnut (Canute), son of Swend, but in 1015 Cnut ravaged a large territory, and was about to attack London when Ethelred died.

ÆTHELREDA, **SAINT**, a daughter of the king of the East Angles, in the 7th c. canonized for her saintly virtues, and whose festival in the calendar is Oct. 17. Her name was popularly abbreviated or corrupted into St. Audrey. At a fair in the isle of

Ely, called after her St. Audrey's fair, it was customary to sell a common kind of lace, which came to be known as St. Audrey's lace. *Tawdry*, as applied to any inferior kind of frippery, is believed to be a corrupt use of the term St. Audrey.

ÆTHELWULF, or **ÆTHELWULF**, d. 858; King of the Anglo-Saxons, son of Egbert. Ethelwulf's reign was mainly occupied in wars against the invading Danes. In 855, E. made a journey to Rome, taking his youngest son (afterwards Alfred the Great) to have him consecrated as his successor. In France he married Judith, a daughter of the king of the Franks (afterwards married to Ethelbald, her step-son). In consequence of the preferment of Alfred for succession, the eldest son, Ethelbald, planned a revolt, but was pacified on his father's giving him the kingdom of Wessex. See **ÆTHELBALD**.

ETHER (otherwise called **ETHYLIC ETHER**, **VINIC ETHER**, and **SULPHURIC ETHER**) is prepared from alcohol by the action of sulphuric acid at an elevated temperature. On the small scale the apparatus which may be employed for the purpose is the retort and receiver, into which a mixture of equal weights of spirits of wine, or rectified spirit, and oil of vitriol, or, by volume, 2 of alcohol and 1 of sulphuric acid, are placed, and heat being cautiously applied, a liquid distils over, which consists of ether and water. In a short time the contents of the retort begin to blacken, and the operation must be stopped or the distillate will become contaminated with sulphurous acid. On the large scale a modification of the process is carried on, which renders it theoretically a "continuous process," though, practically, there is a limit to the amount of ether distilled over.

The conversion of alcohol, $2C_2H_5OH$, into ether $(C_2H_5)_2O$ and water, H_2O , by oil of vitriol, H_2SO_4 , was at one time considered to be due simply to the strong affinity of the oil of vitriol for water, which enabled it to take possession of the one atom of water, the elements of which form the only difference in the ultimate composition of alcohol and ether. This simple mode of explaining the process of etherification, however, does not acknowledge that the atom of water is not retained by the oil of vitriol, but is given off side by side with the E. in mechanical solution therewith. The theory of the process now generally accepted is too complex for introduction here.

E. is a colorless, transparent, volatile liquid of great mobility and high refractive power, and possessing a fragrant odor, and a fiery, passing to a cooling, taste. When pure, it has the specific gravity 720 (water = 1000) at $60^\circ F.$, though the commercial specimens are never free from water and alcohol, and have the density 740. It boils at $94.8^\circ F.$ ($34.9^\circ C.$) (the commercial at 96°), and yields a very dense vapor, the specific gravity of which is 2586, as compared with air 1000. When reduced to a temperature of $-24^\circ F.$ ($-31^\circ C.$), E. freezes. It volatilizes spontaneously when placed in an unconfined position, as in the palm of the hand, and vaporizes so quickly as to produce intense cold. Indeed, when water is covered with E., and the latter assisted in its evaporation by being blown upon, it escapes so readily as to reduce the temperature of the water to $32^\circ F.$, when it freezes. It is very inflammable, burning with a yellow-white flame; and mixed with air or oxygen, it gives rise to a dangerous explosive mixture, and hence great care requires to be taken in its distillation to keep all lights and fires out of the room where the vapors are condensing. When E. is added to its own bulk of water, briskly agitated, and allowed to settle, the two liquids appear to separate again; but it is found that the E. has taken up one-eighth of its volume of the water, whilst the latter has dissolved the same quantity of ether. It is readily miscible with alcohol in all proportions. E. is one of the best solvents for the oils and fats, and hence is employed in analysis for the solution and separation of the oils from other organic matters, as in the analysis of oil-cakes, etc. It is also a good solvent of iodine, sulphur, phosphorus, and of strychnine, and other alkaloids, as well as of corrosive sublimate, and other salts.

E. is useful in the preparation of freezing mixtures, and the mixture of E. and solid carbonic acid gives rise to the lowest temperature which has as yet been attained. When inhaled by man and the lower animals, E. first produces stimulating and intoxicating effects, but afterwards it gives rise to drowsiness, accompanied by complete insensibility, which entitles E. to be regarded as an important anæsthetic agent; and, indeed, for some time it was the only agent used for producing anæsthesia (q. v.) in operations, but has been partly superseded by the employment of chloroform.

The radical of ether, C_2H_5 , substitutes the hydrogen in many acids, forming compound ethers, possessing great fragrant; the more important of which are given in the following table:

| | | |
|-----------------------|--------------------------------|----------------------|
| Acetic Ether..... | $C_2H_5 \cdot C_2H_3O_2$ | |
| Butyric Ether..... | $C_2H_5 \cdot C_4H_7O_2$ | Pine-apple Oil. |
| Caproic Ether..... | $C_2H_5 \cdot C_6H_{11}O_2$ | } Essence of Melons. |
| Rutic Ether..... | $C_2H_5 \cdot C_{10}H_{19}O_2$ | |
| Pelargonic Ether..... | $C_2H_5 \cdot C_9H_{17}O_2$ | Essence of Quinces. |
| Enanthic Ether..... | $C_2H_5 \cdot C_7H_{13}O_2$ | Wine Oil. |

There are other ethers, in which the radical of ether is not one of the members, as

| | | |
|-----------------------------|-----------------------------|-----------------------|
| Amyl Acetic Ether..... | $C_5H_{11} \cdot C_2H_3O_2$ | Jargonelle Pear Oil. |
| Amyl Valerianic Ether..... | $C_5H_{11} \cdot C_5H_9O_2$ | Apple Oil. |
| Methyl Salicylic Ether..... | $CH_3 \cdot C_7H_5O_3$ | Oil of Winter Greens. |

ETHER, sometimes **ÆTHER**, the name given to the medium which is assumed in astronomy and physics as filling all space. It was shown by Newton, that if light consisted of material particles projected from luminous bodies, these must move *faster* in solids and liquids than in air, in order that the laws of refraction might be satisfied in their motions. Huyghens, on the other hand, showed, that to account for the same laws on the supposition that light consisted in the undulatory motions of an elastic medium, it must move more *slowly* in solids and fluids than in gases. Fizeau and Foucault have lately, by different methods, measured these velocities relatively, and have found Huyghens's prediction to be correct. Light, then, consists in the vibratory motion of a medium, which must, of course, fill all space. This is called ether. As yet, we have no idea as to its ultimate nature; some of our greatest philosophers, even, have supposed that it may be of the class of ordinary gases, and that our atmosphere, for instance, is not finite in extent, but pervades, with greatly reduced density, all interplanetary and interstellar space. Many objections, however, may easily be raised against this supposition. Meanwhile, we may remark, that the mathematical theory of light, on the hypothesis of undulations, requires that the vibrating medium should possess properties more nearly allied to those of an elastic *solid* than those of a liquid or a gas. The E. being *required* for the explanation of the existence and the propagation of light, it becomes a matter of importance to inquire how many more of the physical forces may be referred to the same cause or medium. Radiant heat most certainly may, and, in all probability, gravitation, molecular actions, magnetic, electric, and electro-dynamic attractions and repulsions, are also to be thus explained. As to sensible and latent heat, electricity and magnetism themselves, the necessity is not so clear; but even these have been of late *almost* satisfactorily explained by the hypothesis of the all-pervading ether. See **FORCE**. In the article just referred to, a good deal more will be found with reference to this subject, and especially with reference to the impossibility of the E.'s consisting of air or other gases, which are made up of distinct and separated particles.

Many of the ancient philosophers had a shadowy idea, or theory it may be called, in regard to the medium which we term cosmic, or luminiferous, ether. The ancient Greeks personified it, *Æther* being, according to Hesiod, the son of Erebus and Night, and the brother of Day. They also regarded this personification as the representation of the great force of the universe, as well as original matter, which, in a mysterious union with this force, evolved the worlds. The Orphic hymns speak of *Æther* as the soul of the world, the animator of all things, the great principle of life, the divine essence. The children of *Æther* and Day were the objects of the visible creation, the heavens with all their stars, the land, the sea. *Æther* was the lightest and the most active form of matter, and Day had the power of converting it into heavier and visible matter. It seems as though the human mind has the power, given it by the creator, of foretelling great truths afterwards to be demonstrated. Plato spoke of *æther* as being a form of matter far purer and lighter than air; so light that its weight cannot be ascertained because diffused through infinite space. It would at first appear surprising that the substance which Huyghens found it necessary to assume to demonstrate the laws of reflection and refraction, and particularly of double refraction, should not have been regarded by the greater portion of the scientific world as a reality, as a substance necessary for the performance of many physical phenomena. But Newton's emission theory of light, or, perhaps it may more correctly be said, his elaboration of the emission theory of Descartes, held the belief of the world for nearly a century and a half, and this theory did not require the supposition of such a medium, although both Newton and Descartes conceived of its existence. Huyghens's undulatory theory was so thoroughly founded upon the doctrine of an ether that its opponents were perhaps, in their opposition to his theory, insensibly led to ignore the existence of this medium; for the propagation of light by the emission of particles of matter needed no medium for them to pass through; they could pass through vacuous space, although there were some phenomena which seemed to suggest that the assumption of such a medium would aid in their explanation. But Huyghens's theory required the existence of the medium, although, strange as it may seem, the great mathematician Euler, an advocate of the doctrine of undulations, rejected the doctrine of an ethereal medium. Prof. Grove, a modern British scientist, in his essay on the *Correlation of Physical Forces*, offers the following arguments, here briefly stated, against the doctrine of a cosmic ether. The tendency that the particles of bodies have to fly off into space is so great that it has been impossible hitherto to cause an inclosed space to be void of ponderable matter. Gaseous matter has so strong a tendency to fly off into space that no part of the universe could, after a time, be free from its particles. Again, it must be assumed that light is lost in the interstellar spaces, because, if it were not so, there could be no night, all of the stars being suns. Now, an argument which chimes in with the doctrine of the correlation of physical forces, is that the light from these innumerable suns is transmuted into another force, and this requires the existence of matter in the spaces, such matter as would be furnished by the expansion into space of the aerial matter which envelops the different worlds. The strongest arguments in favor of the belief in a cosmic ether are that it allows of a perfect explanation of all the phenomena of radiation, refraction, diffraction and polarization of light, and that such explanation cannot be made without assuming the existence of such a medium. See **HEAT**; **LIGHT**.

ETHEREGE, or **ETHERIDGE**, Sir **GEORGE**, 1636-89; b. London; educated at Cambridge, and traveled in the continent, where he saw some of Molière's dramas. After the restoration of Charles II. he began to write for the stage, producing first *The Comical Revenge, or Love in a Tub*, which was highly successful. He was at once admitted to the circle of wits and poets of the time, and led a careless and somewhat loose life. By a questionable alliance with Mrs. Barry, the actress, he had one daughter, who died young. Among Etheridge's plays were *She Would if She Could*, and *The Man of Mode, or Sir Fopling Flutter*, in which the chief character was a portrait of Beau Hewitt, the Brummel of the period, while he represented in other parts Sir Charles Sedley, and also himself. But he fell to gambling and lost his fortune. Then he married a rich widow, and again had money. In 1686, he was appointed resident minister at Ratisbon, where it is said that while conducting a party of friends to the stairs after a banquet he fell over the banisters and broke his neck.

ETHICS, a word of Greek origin, meaning nearly the same thing as the more familiar term morals. The science, treating of the nature and grounds of moral obligation, and expounding our various duties, is called sometimes by the one term, and sometimes by the other. This is a subject wherein opinions so different from each other have been, and are still held, that a writer's task must lie first in explaining what are the chief points in dispute, and next in giving an account of the positions taken up by the opposing schools.

There are two distinct questions connected with the theory of morals. The first is the properly ethical question, and is, what is *the criterion of a moral act*? otherwise expressed as the *moral standard*—the circumstance determining an action to be *right*, and not *wrong*, nor simply indifferent as regards right and wrong. What determines us to single out some conduct as the subject of *moral approbation*, and other conduct as the subject of *moral disapprobation*? We consider murder, theft, breach of promises or contracts, resistance to authority, cruelty, ingratitude, slander, holding of slaves, polygamy, to be wrong, or immoral; and the science of E. is called upon to assign the reason, or reasons, why these various actions are so accounted.

The other question is properly psychological; in other words, relates to the constitution of the human mind. It is, by what *faculty of our nature* do we recognize this difference in actions? Is it by one of our ordinary intellectual faculties, such as reason? or by some of our emotional susceptibilities, as love and hatred? or by a mixed faculty like prudence? or by something peculiar and distinct, relating to this one object and no other, as the eye is formed for recognizing color, and the ear for sound? This question has been often improperly mixed up with the other, although there are certain theories wherein the answer to the first depends on the answer to the second.

As regards the standard of morals, it should be premised that punishment for neglect is what shows an action to be obligatory. We may dislike a man's conduct; but if we do not consider it deserving of punishment, it is not immoral in our eyes. People's imprudences, whereby they hurt themselves alone, are disapproved of; but there is seldom any disposition to step in by way of penalty in order to prevent such conduct; the disapprobation, therefore, is not of the moral kind. The punishment inflicted by society is partly legal, or through the civil government, and partly by public opinion, which, by attaching a stigma to certain conduct, is able to inspire no less dread than the civil authority. The punishment, by society acting in this way, is sometimes called the popular sanction, to distinguish it from the legal sanction. *Dishonor* is another name for the same thing. Many kinds of conduct tolerated by law, are still punished by the loss of public esteem and the infliction of disgrace. Cowardice, eccentricity, heterodoxy beyond certain limits, expose the individual to public censure. Many kinds of inhumanity, as maltreating dependents, have no other check than expressed disapprobation.

There have been various theories to account for the singling out of some actions to be authoritatively forbidden by law and society—that is, forbidden by the sanction of punishment. Some have said that the will of the Deity, or divine revelation, has indicated what we are not to do, and that there is nothing left to us but to conform to what is thus prescribed; others, as Cudworth, maintain, on the contrary, that what the Deity commands must be such as our own conscience approves, otherwise we could not give him the character of being independently good and just. It has been said that right reason shows us the difference between right and wrong; this was Cudworth's own view. Samuel Clarke conceived that there was an eternal and intrinsic *fitness* in the things considered as right, and an unfitness in the wrong, "with a regard to which the will of God always chooses, and which ought likewise to determine the wills of all subordinate rational beings." Both these writers aimed at replying to Hobbes, who had maintained that the civil magistrate is supreme in morality as well as in politics; meaning, however, in all probability, that the magistrate himself ought to frame his dictates in one, as in the other, with a view to the public good, which would be a utilitarian view. The phrase "the moral sense," which now represents perhaps the most prevalent moral theory, occurs first in Lord Shaftesbury's *Inquiry Concerning Virtue*, from whom it was adopted by Hutcheson, and has since passed into general currency. Sometimes it has been maintained that a regard to self-interest is the only ultimate rule of right, which

has a very different meaning, according as we look at self exclusive, or inclusive, of other men's wellbeing. The most enlarged benevolence, in one view, is but an aspect of self. Adam Smith, in his *Theory of Moral Sentiments*, laid down as the criterion of right, the "sympathetic feelings of the impartial and well-informed spectator." But although this theory acknowledges our bias in the capacity of agents, it presumes us to be infallible when acting as judges or critics, a position by no means self-evident. The spectator has his own failings as well as the actor, unless specially qualified by nature and education to play the part of a moral judge. But to pass on. Jeremy Bentham is known as the most distinguished propounder of the principle of utility as the basis of morals, a principle explained by him as in contrast, first to asceticism, and next to "sympathy and antipathy," by which he meant to describe all those systems, such as the moral sense theory, that are grounded in internal feeling, instead of a regard to outward consequences. In opposing utility to asceticism, he intended to imply that there was no merit attaching to self-denial as such, and that the infliction of pain, or the surrender of pleasure, could only be justified by being the means of procuring a greater amount of happiness than was lost. Paley also repudiated the doctrine of a moral sense, and held that virtue is "the doing good to mankind, in obedience to the will of God, and for the sake of everlasting happiness." The utilitarian theory of Bentham, with various modifications, has been defended and expounded by James Mill, in his *Analysis of the Human Mind*, and in his anonymous *Fragment on Mackintosh*; by John Austin, in his *Province of Jurisprudence Determined*; and by Mr. John Stuart Mill in his *Dissertations and Discussions*, and in *Fraser's Magazine* (Oct. to Dec., 1861).

The great controversy may be said to lie between the adherents of the moral sense in some form or other, and those that deny both the existence of a separate faculty in the mind for perceiving moral distinctions, and the validity of the determinations of the individual conscience; maintaining that morality ought to be founded on a regard to the well-being of mankind, and that exclusively; and that rules of morality grounded on any other motives are indefensible. In short, the question is, Is morality an intuition of the mind, or is it, like the government of the state, a positive institution, on which different societies may differ, and which may be set up or abrogated at the pleasure of the society?

The theory of intuitive morality was vigorously assailed by Locke in his *Essay on the Understanding* (book i. chap. 3); and we may venture to say that his objections to what he called "innate practical principles" have never been answered. These objections have been given in a condensed form by Paley (*Moral Philosophy*, book i.). Locke urged that, in point of fact, there are no principles universally received among men; that moral rules require a reason to be given for them, which ought not to be necessary, if they are innate; that virtue is generally approved of, not because innate, but because profitable; that innumerable enormities have been practiced in various countries without even causing remorse; that the moral rules of some nations are flatly contradicted by others; that no one has ever been able to tell what the innate rules are; that we do not find children possessed of any moral rules, etc. It has been attempted to reply to the objection, founded on the great variety and opposition of moral rules in different places and times, by saying that although the substance of the moral codes differ—one part of the world being monogamous and chaste, while other nations allow promiscuous intercourse of the sexes—all agree in enjoining some moral rules; nowhere is there an absence of social and moral obligations. But this is to depart from the original question, which was to assign the standard of morals, the criterion for determining which of two opposite courses—monogamy or polygamy—is the correct or moral course. The intuitive moralists say that human nature is endowed with an instinct which at once approves the right and disapproves of the wrong, and that we need go no further than our own conscience to settle the point. Now, when the existence of contradictory consciences is pointed out, it is not to the purpose to say that these are still consciences, and indicate something as obligatory; this all admit: what we desire is to determine which we are to follow.

Dr. Whewell, in his *Elements of Morality*, has proposed a way out of this serious difficulty by setting up a supreme or standard conscience, by which the individual conscience may be squared and corrected; but he has not told us who are the men whose conscience is the standard; it being obvious that the human race, as a whole, do not recognize any such, although each separate community might consent to take some of its most estimable citizens, or the interpreters of its religious code, as models to conform to.

The following is one view of the nature and origin of our moral principles which would seem free from the grave objections above alluded to. If we set aside for the present the question as to the *proper* standard of morals, the criterion that we should consider the right criterion, if we had to enact a code of morals for the first time, and if we look at the moral principles that have prevailed in different nations and times, we shall find that they have been dictated from two distinct kinds of motives. The one is utility, in the sense of the common safety of men living in society. The prohibitions against manslaying, theft, breach of bargain, rebellion, are necessary, wherever men have formed themselves into communities; and it is the agreement in such matters as these—although subject still to very great varieties—that makes up the amount of

uniformity actually observed in the moral codes of nations. If the society did not agree to protect life and property, by punishing the murderer and the thief, nothing would be gained by coming under the sway of government, and human beings would not be got to associate themselves in tribes or nations. The common end gives a common character to the means, without supposing a special instinct to suggest that stealing is wrong. But, in the second place, there have been, in the moral codes of all countries, prohibitions not connected with any public utility, but prompted by strong sentimental likings or aversions, which have acquired the force of law, and are made the foundation of compulsory enactments. Of this kind is the antipathy of the Jew and the Mohammedan to the pig, the Hindoo repugnance to animal food generally, and the usages of a merely ceremonial kind prevailing among many nations, which are as stringently enforced by law and public opinion as the sacredness of life and property. For a woman, among the Mussulmans, to expose her face in public, is as great an offense as going naked would be with us; while, among savage tribes, in warm climates, where clothing is little required, it is no shame to expose the whole person. For these practices, no reason can be given; the public sentiment has determined some things to be right and others wrong, without reference to any public or private utility; and it is in these enactments, founded on liking or disliking, that nations have differed most widely, the difference often amounting to contrariety. The ancient Greeks held it as a sacred obligation to drink wine in honor of Dionysus (Bacchus); the Nazarenes among the Jews and the Mohammedans entertained an opposite view. A legislator for the North American Indians might prohibit alcoholic liquors on the ground of public utility, the natives not being able to control themselves under stimulants; but the prohibition of wine in those other instances is probably a species of asceticism, or an aversion to human pleasures as such, which belongs to the domain of sentiment, and not to the consideration of utility.

Looking at the many capricious injunctions that owe their origin to fancies such as these, it may be doubted whether the human race can ever gain anything by departing from the principle of utility as the sole criterion of good morality; and there is an increasing tendency to recognize the supremacy of this principle both in morals and in legislation. Justice, truth, purity, although sometimes viewed sentimentally, or as being ends themselves, are in men's practice looked upon more and more as of the nature of *means*, the promotion of human happiness being the end.

A great number of the existing moral rules can be traced to a distinct historical origin, proving still more decisively that they are not the suggestions of a universal instinct of the human mind. The Mohammedan code of morals came from Mohammed; Confucius was the moral legislator of one large section of the Chinese. The making of the marriage tie irrevocable in Christendom was an exercise of papal authority in the 13th c., and has since been repealed in some Protestant countries, although retained in Catholic states. See *DIVORCE, MARRIAGE*. The sentiment which forbids the holding of human beings as slaves is chiefly the growth of the last two or three centuries.

Although the doctrine of intuitive morality is, in this view, denied, it is still admitted that there is such a power in the mind as conscience, which warns us when we are doing wrong, and is to a certain extent a force to make us do right. But it cannot be shown that we are born with any such principle, combining both enlightenment and motive power. Conscience is a *growth*. There are in our constitution certain primitive impulses that so far coincide with what is our duty, and therefore contribute to the formation of the conscience; these are principally self-preservation, or a regard to ourselves, and sympathy, or a regard to others. There are many duties that we are prompted to for our own interest, such as telling the truth, in order that people may confide in us; obeying the laws, to avoid punishment, etc. But we cannot perform all our social duties if we look merely to ourselves. We must, in addition to prudence, have a source of *disinterested* action, inducing us both to avoid injuring our fellow-beings in the promotion of our own selfishness, and occasionally to sacrifice ourselves for the sake of others. Such a principle exists in our mental nature, although not of equal strength in all minds. Being provided with these two primitive springs of action, we are susceptible of being educated to the sense of moral obligation. The child is first taught obedience by penalties, and is made to associate pain with forbidden actions. This is the germ of conscience. Habits of avoiding what is prohibited under penalties are gradually formed, and the sense of authority and law is thereby acquired.

When the powers of observation and reason come to maturity, the individual sees why the restrictions of duty have been imposed, and is then ready of his own accord, and apart from the fear of punishment, to behave rightly. The conscience, grounded on fear, then becomes the conscience grounded on spontaneous approval.

Conscience thus follows, and does not precede, the experience of human authority. Authority, sanctioned by punishment, is the type and the starting-point, even when the conscience takes an independent flight, and adopts rules for itself different from those that entered into its education. The great mass of human beings have nothing more than the slavish conscience, or the habits imparted by the exercise of the parental and public authority, which shows what is the most natural foundation of moral sentiment. The persons that judge of right for themselves, instead of implicitly receiving the maxims peculiar to the society where they grow up, are so few as to be

the exception everywhere; their conscience does not prove what is the usual endowment of human nature in this respect.

Inquiries of the nature of those above sketched, proceed upon the assumption that moral distinctions have their ground in the constitution of the world and of man's nature, and may be discovered by the exercise of human reason, as the other laws of the universe are. But practically, the rules of morality have, in almost all communities, been more or less dependent upon a belief in divine laws supernaturally revealed.

ETHIOPIA, the Biblical *Kush*. Originally, all the nations inhabiting the southern part of the globe, as known to the ancients; or rather, all men of dark-brown or black color, were called Ethiopians (Gr. *aitiō—ōps*, sunburned). Later, this name was given more particularly to the inhabitants of the countries s. of Libya and Egypt, or the upper Nile, extending from 10° to 25° n. lat., 45° to 58° e. long.—the present Nubia, Senaar, Kordofan, Abyssinia. The accounts which the ancients have left us with respect to this people are, even where they are not of an entirely fabulous nature, extremely scanty and untrustworthy, as both Greeks and Romans never got beyond Napata, 19° n. lat. We will just mention that from the Homeric age down to Ptolemy—who is somewhat better informed—these regions were peopled by Pygmies, Troglodytes (dwellers in caverns), Blemmyes (hideous men), Macrobia (long-lived men), etc., besides being divided into the land of cinnamon, myrrh, of elephant-eaters, fish-eaters, tortoise-eaters, serpent-eaters, etc. The only portion of ancient records which does contain something akin to historical accounts, is that which refers to Meroë, an island formed by the rivers Astaphus and Astaboras, tributaries of the Nile. There stood, from times immemorial, an oracle of Jupiter Ammon. This, and the central portion of the island, together with the extraordinary fertility of its soil, the abundance of animals, metals, etc., made it not only the chief place of resort for all the inhabitants of the adjacent parts, especially the numerous nomad tribes, but also the emporium for India, Arabia, Ethiopia, Egypt, Libya, and Carthage. Thus it grew so rapidly, that about 1000 B.C. it counted among the most powerful states of the ancient world; and about 760, having ever since Sesostris been tributary to Egypt, it succeeded, under Sabacus, in shaking off the Egyptian yoke, and continued, in its turn, to hold Egypt for about sixty years. During the reign of Psammetichus, 240,000 Egyptians settled in Meroë, which, the greater part of the immigrants being artisans, traders, etc., rose still higher. Many new cities were built, and the state was in the most flourishing condition, when it was conquered by Cambyes, about 530 B.C. He fortified the capital town, and called it Meroë. After the destruction of Thebes by Cambyes, most of the inhabitants of that city took refuge there, and made the country still more Egyptian. Ergamenes transformed its theocracy into a military monarchy, in the 3d century. Under Augustus, Meroë was conquered, and a queen Candace is mentioned as his vassal. Under Nero, nothing but ruins marked the place of this once powerful and highly civilized state. Up to this day, remnants of mighty buildings, covered with sculptures—representations of priestly ceremonies, battles, etc.—and half-defaced inscriptions hewn in rocks, besides rows of broken sphinxes and colossi, are frequently met with in those parts.

Their religion, art, form of government, and civilization, generally being—in their chief features at least—so identical with the Egyptian as to have given rise to the question, which of the two nations imparted their knowledge to the other, we will refer the reader for these points to the article EGYPT; and will proceed now to say a few words on the history of the descendants of the ancient Ethiopians—the inhabitants of the present Habesch, or Abyssinia—as we derive it from their poor and scanty native chronicles.

According to these, the son of Solomon and the queen of Sheba (Makeda as they, Balkis as the Arabian historians call her), named Menilehek, was the first king of the Ethiopians. Few kings' names occur up to the time of Christ, when Bazen occupied the throne. The missionary Frumentius (330) found two brothers (Christians) reigning—Abreha and Azbeha. During the time of the Greek emperor Justin (522), king Elezbaas destroyed the state of the Homerites in Asia, in order to revenge their persecutions of Christians; and was canonized. From 960 to 1300, another dynasty, the Zagoean, held the chief power, all the members of the Solomonic dynasty, save one, having been murdered by Esal, who made her son king. In 1300, Ikon-Amlak, a descendant of this one scion of the house of David, who had fled to Sheba, regained possession of the country, and made Sheba, instead of Axum, the seat of government. To this day, his family rules the country. Frequent revolutions within, more especially brought about by the religious squabbles imported by the Portuguese towards the end of the 15th c., and a host of enemies all around—the most formidable of whom were wild nomad tribes of the desert—forced the kings more than once to apply for foreign help; amongst others, that of the Turks in 1508; and the affairs of the modern state have at all times been anything but prosperous. Special mention is made of king Zara-Jakob (Constantine), 1434–68, who sent an embassy to the church-council at Florence; of Aznaf-Saged (Claudius), 1540–59, during whose reign Christoph. de Gama from Portugal lived in E., and made common cause with him against his enemies. This king also wrote a confession of faith, in which he defended his church both against Jesuits and the charge

of leaning towards Judaism. Socinios (1605-32) openly professed Roman views; but his son Facilides soon expelled the Jesuits and their friends from the country, and put an end to the Roman influence. Among these friends was also Abba Gregorius, later the friend of the great Ethiopologist Ludolf, who, having made his acquaintance at Rome, induced him to migrate to Gotha; where he also remained until his death. Under Joas (1753-69), the Gallas, a nomad tribe, hitherto the mightiest and most dangerous enemies of the Ethiopians, not only gained admission to all the offices in the state, but acquired almost absolute power. One of them (Susul Michael), holding the place of *râsh*, or prime minister and chief commander of the troops, proved a very great friend to Bruce, to whom he also intrusted the government of a province. The several provinces remained practically independent, each chief striving to subdue his neighbors, till in 1855, the chieftain afterwards known as Theodore (q.v.) attained supremacy. See also art. ABYSSINIA. The king resided but rarely in the city, and for the most part remained with his soldiers in the camp. His official name was *Negus*, or in full, *Negus Nagass Za-itjopja*, king of the kings of Ethiopia—alluding to the chiefs of the towns and provinces. The soldiers receive no pay, but rely on plunder; and have proved themselves able to fight bravely.

Emigrants, as were beyond doubt the earliest settlers in E., from the other side of the Arabian isthmus, it is but natural that the structure of their language, as well as that of their own bodies, should bear traces of their Shemitic origin. The reason of this emigration is contained in the very name of this language, which is called *Geez*—free, affording a most striking parallel to the designation *Frano*—French. Free places of habitation were what they came in search of. The name Ethiopian, or, as they call it, Ithiopiajan, they adopted from the Greeks at a very late period. This their oldest language, *Leshana Geez*, was suppressed by a royal decree of Ikon-Amlak, in the 14th c., and the Amharic adopted as the court language. Ever since, it has, with exception of the province of Tigré, where it is still spoken (with slight idiomatic changes), remained the *Leshana Mazhaf*, the language of books and of the church. It is exclusively used in writing, even of ordinary letters, and the educated alone understand it. Its general structure comes as close to that of the Arabic as a dialect can and must. A great many of its words are still classical Arabic; others resemble more the Hebrew and its two Chaldee dialects, the Aramaic and Syriac; others, again, belong to African dialects; and many, as the names of the months, are Greek. It has 26 letters, 22 of which bear the ancient Shemitic stamp, and exhibit the greatest likeness to the Phœnician, the common original alphabet; and seven vowels, including a very short *e*, which sounds precisely like the Hebrew Schêwa. These vowels are represented by little hooks, and remain inseparably attached to their respective letters; and as the Geez, unlike all its sister-languages, is never written without vowels, the alphabet becomes a syllabary with 182 characters. Another difference exists in its being written from left to right—a circumstance from which some have concluded that the Greeks introduced writing in E.; forgetting, in the first place, that Greek itself was frequently written from right to left, and that Zend, certain cuneiforms, hieroglyphs, etc., are likewise written from left to right. We cannot enter here into the grammatical minutiae of the language; we will only mention that out of the ten conjugations, eight are Arabic; that there is a double infinitive, but no participle and no dual; that the formation of the so-called plural, and of declension generally, point to that very remote period when the Hebrew and Arabic made use of the same grammatical processes. There are no diacritical marks employed in writing; the letters are not combined, and the words are separated by two dots.

Although there can be no doubt of the existence of a rich literature in a flourishing country like E. anterior to Christ, still, owing both to frequent internal convulsions, and the misguided zeal of the early Christian missionaries, who here and elsewhere considered it their first duty to destroy all the ancient records of which they could get hold, nothing but a few half-erased inscriptions have survived. The earliest existing document of post-Christian literature is a complete translation of the Bible, probably by Frumentius. See FRUMENTIUS. The Old Testament, probably a translation from the Alexandrine version of the LXX., consists of four parts: 1, the Law or Octateuchos (five books of Moses, Joshua, Judges, Ruth); 2, Kings; 3, Solomon; 4, Prophets, and two books of the Maccabees. The New Testament consists of—1, Gospels; 2, Acts; 3, Paulus; 4, Apostolus. A very peculiar book, Henoch, belongs also to the literature of the Old Testament. See ENOCH, BOOK OF. The New Testament comprises likewise another book, *Senodas*, containing the pseudo-Clementine or apostolical constitutions. The Ethiopians have a liturgy (*Kanon Kedaso*—Holy Kanon) and a symbolico-dogmatical work (*Haimanota Abau*—Belief of the Fathers), containing portions of homilies of the Greek fathers, Athanasius, Basil the Great, Chrysostom, Cyril, Gregory of Nyssa and Nazianzen. Besides these, they have martyrologies, called *Synaxar*. They employ in this their sacred literature a peculiar kind of rhythm without a distinct meter. Any number of rhyming lines forms a stanza, without reference to the number of words constituting the verse, or of verses constituting the stanza. They also use certain phrases as a refrain—not unlike the manner of the mediæval Hebrew Pizmon. See LITURGY, JEWISH. As to general literature, they have neither a written book of laws, nor a grammar of their own language, nor, in fact, anything worth mentioning, except a *Chronicle of Axum* and *Chronicles of Abyssinia*. They are very fond, however, of riddles, wise saws, and

the like, so fascinating to the eastern mind. They have a dictionary, but most of its explanations and translations are utterly wrong. No wonder the learned in Europe should have been sorely puzzled by such a language, and that they should, after long consideration, have pronounced it to be either "Chaldee" or "Indian," while Bruce held it to be the language of Adam and Eve. Potgen, a Cologne church-provost, happening to be at Rome at the beginning of the 16th c., there made the acquaintance of native Ethiopians, and became the first to enlighten the world on the nature of this occult language. After him came the Carmelite Jacob Marianus Victorius, from Reate, who wrote *Institutiones Linguae Chaldaee S. Ethiop.* (Rome, 1548), an entirely worthless book; then Wemmers, who in 1683 published an Ethiopian grammar and dictionary. The principal investigator, however, is Hiob Ludolf from Gotha, who, aided by the Abba Gregorius, before mentioned, and supported by his own extraordinary linguistic talents and indomitable energy, acquired such a power over this language, that notwithstanding the number of eminent Orientalists, such as Platt, Lawrence, Dorn, Hupfeld, Hoffmann, Roediger, Ewald, Isenberg, Blumenbach, etc., who have since worked in this field, his books, as re-edited by Dillmann, still hold the first place. It is hardly necessary to add, that the Ethiopian is one of the most important and indispensable languages to the Shemitic scholar, containing as it does a great many words and forms of a date anterior to the separation of the different Shemitic dialects. Among the most important Ethiopian books printed in Europe are the Psalms, edited with a Latin translation by Ludolf (Frankfort, 1701); the New Testament, in two volumes (Rome, 1548); the book of *Henoch* (Lond. 1840); *Ascensio Isaiae Vatis*, with a Latin translation by Lawrence (Oxford, 1819); *Didascalia*, or apostolical constitution of the Abyssinian church (Lond., 1834). Good treatises are Dillmann's *Grammar of Ethiopic* (Leip., 1857); Prætorius' *Grammar* (Halle, 1871); Schreiber, *Manuel de la langue Tigrâi* (Vienna, 1887). Since the English expedition to Abyssinia, the British museum possesses a larger number of Ethiopic MSS. than any other library.

ÆTHIOPS, or **ÆTHIOPS** (Gr. *aiḥō*, I burn, and *ops*, countenance; being of a black or burned countenance), is a term applied by the ancient chemists to certain oxides and sulphides of the metals which possessed a dull, dingy, or black appearance. Thus, *ethiops martialis* was the mixture of protoxide and peroxide of iron, known as the black oxide; *ethiops mineral*, or *ethiops narcoticus*, the black-gray sulphuret of mercury procured by triturating in a mortar a mixture of mercury and sulphur; and *ethiops per se*, was obtained by agitating commercial mercury for weeks or months, when the oxygen of the air slowly formed the black oxide of mercury.

ETHMOID BONE, THE (so called from *ēthmos*, a sieve), is one of the eight bones which collectively form the cavity of the cranium. It is of a somewhat cubical form, and is situated between the two orbits of the eye, at the root of the nose. Its upper surface is perforated by a number of small openings (whence its name), through which the filaments of the olfactory nerve pass downwards from the interior of the skull to the seat of the sense of smell, in the upper part of the nose. It consists of a perpendicular central plate or lamella, which articulates with the vomer and with the central fibro-cartilage, and thus assists in forming the septum or partition between the two nostrils. The lateral masses present a very complicated arrangement, and are so planned as to give in a small space a very large amount of surface, on which the filaments of the olfactory nerve are spread. In comparative anatomy, we find a direct ratio between the development of these masses and the acuteness of the sense of smell. See NOSE AND THE SENSE OF SMELL.

ETHNOGRAPHY, a term closely allied to ethnology (q.v.). Ethnography embraces the details, and ethnology the rational exposition, of the human aggregates and organizations known as hordes, clans, tribes, and nations, especially in the earlier, the savage, and barbarous stages of their progress. Both belong to the general science of anthropology (q.v.), or the natural history of mankind, being related to it as parts to a whole. Ethnography and ethnology, indeed, run up into anthropology as anthropology does into zoölogy, and zoölogy into biology. No very sharp line can be drawn between these two sciences themselves, their differences being mainly those between the particular and the general, between the orderly collection of local facts, and the principles according to which they may be grouped and interpreted. Ethnographers deal with particular tribes, and with particular institutions and particular customs prevailing among the several peoples of the world, and especially among so-called savages. Ethnologists bring simultaneously under review superstitions, legends, customs, and institutions which, though scattered in distant regions of the earth, have some common basis or significance. Ethnography and ethnology run as easily one into another as the two sections of general anthropology, viz.: 1, anthropology proper, as expounded by anatomists and physiologists, who deal with the different races of men, their elements, modifications, and possible origin; and, 2, demography, which, as constituted by the researches of Quetelet and his friends and disciples, as Farr, Galton, Guillard, and Bertillon, treats of the statistics of health and disease, of the physical, intellectual, physiological, and economical aspects of births, marriages, and mortality. Ethnography, ethnology, and anthropology are interwoven with philology, jurisprudence, archæology, geography, and the various branches of history. A fact may require to be investigated successively by linguists,



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9.

1. MADAGASCAR.

2. NUBIA.

3. WEST INDIES.

4. BORNEO.

5. SWITZERLAND.

6. RUSSIA—STEEPES.

7. SUMATRA.

8. DEMERARA.

9. MALAY.

TYPES OF NATIONS.

anatomists, and mathematicians. In current language, ethnography and ethnology are often used indiscriminately; but if a distinction be made between them, an instinctive perception teaches us to speak of ethnographic facts and ethnological theories, of ethnographic literature and ethnological science—ethnology being related to ethnography as the wine to the grape.

ETHNOLOGY (Gr. *ethnos*, nation or race, and *logos*, discourse), a term applied to the science that treats of the persistent modifications of the human family or group; their most marked physical, mental, and moral characteristics when compared one with the other; their present geographical distribution on the globe; their history traced backwards to the earliest attainable point; and, finally, the languages of the various nations and tribes of mankind, existing or extinct, classified and compared, with the view, by their means, of determining the chief points of resemblance or dissimilarity among the nations of the earth. This science has gradually outgrown its name. It has been therefore deemed expedient to apply to it a term of wider and more neutral significance—namely, anthropology—derived from the Greek *anthropos*, man, and *logos*, a discourse. The term *ethnology* has this inconvenience, that it means no more than the “science of races,” and many authorities not only deny the existence of *races* of mankind, affirming that what are called races are in reality distinct species, but others argue that the term is as applicable to any races—e.g., races of dogs, or cats, or pigeons—as to the races of mankind. Hence the more exact and less sectarian term anthropology has been applied to denote the science that treats of the natural history of man. The science is divided into three branches—1. *Zoological anthropology*, which treats of the relations of man to the brute creation; 2. *Descriptive anthropology*, or ethnography, which classifies and describes the various divisions and subdivisions of mankind, and marks out their geographical distribution; 3. *General anthropology*, which M. Broca calls “the biology of the human race,” which, says a recent writer on the subject, “borrows and collates from all sciences facts and phenomena usually investigated in men as individuals, but which relate to men as groups of individuals,” and compares these with other facts relating to other groups of individuals. The study and bare description of a single negro’s skull is mere human anatomy; the study of a group of negroes’ skulls, and the description and comparison of their peculiarities with those of groups of skulls belonging to other races, would be a specimen of the work done by general anthropology.

No one can look at an Englishman, a red Indian, and a negro, without at once noticing the differences between the three, not only as regards the color of their skin, but the shape of the skull, the texture of the hair, and the character of the several features, as eyes, lips, nose, and cheek-bones. What strikes the ordinary observer chiefly is, of course, the difference of complexion; but the anatomist is fully as much interested in the shape of the skull. The first thoroughly scientific writer who endeavored to lay down a method of distinguishing between the different races of mankind by a comparison of the shape and size of the skull was Peter Camper, a distinguished Dutch anatomist of last century. He laid down a technical rule for ascertaining the *facial line*, and determining the amount of the *facial angle*, which he has thus described: “The basis on which the distinction of nations is founded may be displayed by two straight lines, one of which is to be drawn through the *meatus auditorius* to the base of the nose, and the other touching the prominent center of the forehead, and falling thence on the most advancing part of the upper jaw-bone, the head being viewed in profile. In the angle produced by these two lines may be said to consist not only the distinctions between the skulls of the several species of animals, but also those which are found to exist between different nations.” The heads of birds display the smallest angle, and it apparently becomes of greater extent “in proportion as the animal approaches more nearly to the human figure. Thus, there is one species of the ape-tribe in which the head has a facial angle of 42 deg.; in another animal of the same family, which is one of those simiæ most approximating in figure to mankind, the facial angle contains exactly 50 deg. Next to this is the head of the African negro, which, as well as that of the Kalmuck, forms an angle of 70 deg.; while the angle discovered in the heads of Europeans contains 80 deg. On this difference of 10 deg. in the facial angle, the superior beauty of the European depends; while that high character of sublime beauty which is so striking in some works of ancient statuary, as in the head of Apollo, and in the Medusa of Sissocles, is given by an angle which amounts to 100 deg.” The nearer the facial angle approached a right angle, the greater was held to be the intellectual development of the race. But M. Jacquart, of the natural history museum in Paris, showed that the facial angle in stupid people very often approached closely a right angle, and that, in the homogeneous population of Paris, the facial angle varied within wider limits than those Camper stated as a criterion of distinct species.

Camper’s method was abandoned for the vertical method, or *norma verticalis*, invented by Blumenbach. The object being to collect the greatest number of characteristics—“The best way,” says Blumenbach, “of obtaining this end is to place a series of skulls with the cheek-bones on the same horizontal line resting on the lower jaws; and then viewing them from behind, and fixing the eye on the vertex of each, to mark all the varieties in the shape of parts that contribute most to the national character,

whether they consist in the direction of the maxillary and malar bones, in the breadth or narrowness of the oval figure presented by the vertex, or in the flattened or vaulted form of the frontal bone." Founding upon this mode of admeasurement applied to a large collection of skulls of different nations, accumulated by himself, Blumenbach classified the human family into the following five varieties—viz., the Caucasian, Mongolian, Ethiopian, Malay, and American. In the first of these—which he made to include the Caucasians or Circassians proper, the Celts, the Teutons, the Shemites, the Libyan family, the Nilotic family, and the Hindustanic family—the skull is large and oval, the forehead expanded, the nasal bones arched, the chin full, and the teeth vertical. In the second—which embraces the Chinese and Indo-Chinese, the natives of the polar regions, the Mongol Tartars, and the Turks—the skull is oblong, but flattened at the sides, the forehead low and receding, the nose broad and short, and the cheek-bones broad and flat, with salient zygomatic arches. In the third—embracing the Negroes, Kafirs, Hottentots, Australians, Alforians and Oceanic Negroes—the skull is long and narrow, the forehead low, the nose broad and flat, the cheek-bones prominent, the jaws projecting like a muzzle, the lips thick, and the chin small. In the fourth—embracing the Malays and Polynesians generally—the skull is high and square, the forehead low, the nose short and broad, and the jaws projecting. In the fifth—embracing the American family and the Toltican family—the skull is small, with the apex high, and the back part flat, the forehead receding, the cheek-bones high, the nose aquiline, the mouth large, and the lips tumid.

This classification of the human family, with the added characteristics, under each class, of complexion, hair, and eyes, is, upon the whole, the most popular, Blumenbach having taken considerable pains to elaborate it, and present it to the world in a form acceptable to scientific inquirers. Later researches, however, have proved it to be not quite tenable. Thus, Cuvier reduced the five classes of Blumenbach to three—viz., the Caucasian, Mongolian, and Ethiopian, treating the Malay and American as subdivisions of the Mongolian. Jacquinot does the same. Dr. Prichard, who brought to the study of E. not only a large acquaintance with physiology, but a considerable knowledge of languages, admits a greater number of varieties than Blumenbach, but divides his Caucasian class into two independent groups, which he calls the Syro-Arabian or Semitic, and the Aryan or Indo-Germanic. Moreover, he objects to the term Caucasian, as representing the notion that mankind had their origin on mountain heights. For himself, Prichard holds with the view that it was rather on the banks of large rivers and their estuaries that the primitive nations developed themselves. "The cradles or nurseries of the first nations, of those at least who became populous, and have left a name celebrated in later times, appear to have been extensive plains or valleys, traversed by navigable channels, and irrigated by perennial and fertilizing streams. Three such regions were the scenes of the earliest civilization of the human race, of the first foundation of cities, of the earliest political institutions, and of the invention of the arts which embellish human life. In one of these, the Semitic or Syro-Arabian nations exchanged the simple habits of wandering shepherds for the splendor and luxury of Nineveh and Babylon. In a second, the Indo-European or Japetic people brought to perfection the most elaborate of human dialects, destined to become in after-times, and under different modifications, the mother-tongue of the nations of Europe. In a third, the land of Ham, watered by the Nile, were invented hieroglyphical literature, and the arts in which Egypt far surpassed all the rest of the world in the earlier ages of history." Dr. Prichard, in his well-known *Natural History of Man*, commences with a description of these three divisions of the human race, not as discriminated one from the other by the form of the skull, but as comprising nearly all the civilized communities, and indeed most of the tribes of people known to antiquity. "They were neither nomades nor savages, nor do they display in their crania either of the forms principally belonging to races in those different states of existence. They had all heads of an oval or elliptico-spherical form, which are observed to prevail chiefly among nations who have their faculties developed by civilization." As they cannot, however, by any means be made to comprehend all the types of man, after the Egyptians, he describes the great body of the nations of Africa, embracing tribes sunk in the lowest state of degradation; and after the Aryans, or Indo-Europeans, the people of high Asia, chiefly nomades, inhabiting vast steppes, and never rising in the scale of civilization beyond the condition of wandering shepherds, though in this capacity possessing some wealth, and acquainted with the use of clothing, tents, and wagons. "These classes of nations," he observes, "have different physical characters. Among the African savages we find the *prognathous* form of the head and all its accompaniments; and these traits display themselves in proportion to the moral and physical degradation of the race. In Northern Asia, most of the inhabitants have the pyramidal and broad-faced skulls." Referring our readers to the articles ARYAN RACE, EGYPT, and SEMITIC NATIONS respectively, for more detailed information on the subject of these three grand divisions of mankind, we shall here only notice Dr. Prichard's subdivisions of one of them, namely, the Aryan race.

The great Aryan or Indo-European race, which extends itself from the mouth of the Ganges to the British islands and the northern extremities of Scandinavia, divides itself, according to Prichard, into two branches—viz., the parent stock in Asia, and the colonies that it successively sent forth into Europe. The Asian branch comprises: 1. Hin-



ETHNOLOGY.—1. Turkoman. 2. Women of the Kundorfski (nomadic) Tartars. 3. Yukon
 8. Javanese woman and child. 9. Javanese in court-dress. 10, 11, 12, 13. Eyes of
 lady. 18. Native of Papua. 17, 19, 22. Prehistoric skulls. 20. Circassian lady. 2
 habitants of N. China. 28. Head of Burman hairy man. 29. Suane lady (Caucasus)



1. Hawaiian (Alaska Terr.). 4. Brahmin. 5. Native of South China. 6. Hottentot. 7. Burman.
 8. Japanese, Korean, Chinese and Dyak. 14. Mozambique negro. 15. Bushman. 16. Grecian
 Finlanders. 23. Munga chief—Africa. 24. Hottentot skull. 25. Hawaiian. 26, 27. In-
 30. Negrito skull of Northwest Luzon. 31. Javanese chief.

dus; 2. Persians; 3. Afghans; 4. Baluchi and Brahui; 5. Kurds; 6. Armenians; and 7. Ossetines. The collective body of the European nations are now generally regarded as a series of colonies from Asia. The proof turns mainly on a comparison of languages; the ancient Sanscrit being regarded by the most competent judges as the parent not only of the Greek and Latin languages, but of the Teutonic, with its several ramifications of the Slavonic, Lettish, Lithuanian, and even Celtic. Dr. Prichard himself was the first to point out the affinity of the Celtic with the Sanscrit, Greek, Latin, and Teutonic, in a memoir published by him in 1831, on the *Eastern Origin of the Celtic Nations*. Later philologists have confirmed the view taken by him, and he is perhaps correct also in the conclusion, that they were the first great immigration of the Aryans into Europe, who were afterwards conquered, and their numbers considerably reduced by fresh advancing colonies from the same parent hive. But there are other nations or tribes of Europe which no efforts of the philologists have succeeded in tracing to the Aryan stock; such are the Lapps, Finns, Tschudes, and Ugrians of the n., and the Euskaldunes, now principally represented by the Basques in the west. To these, Dr. Prichard has given the appellation of Allophylian (Gr. *allos*, another, and *phleu*, tribe), thereby signifying their independence of the Aryan stock. The progenitors of these tribes were probably the inhabitants of Europe, prior to the first Aryan immigration.

After these several races, Dr. Prichard treats of the native tribes of the austral seas and the great Southern ocean, and finally, of the native inhabitants of America. In every case, he carefully describes the physical appearance or structure, the geographical *habitat*, history, and migrations (if any), the language, and the moral and psychical attributes of the nation or tribe immediately brought under notice. His information has generally been obtained from the best sources, and hence his works may be regarded as a storehouse of knowledge upon the subject of ethnology.

But both before and since Blumenbach and Prichard, there have been several classifications of the human race proposed, the simplest of which is perhaps that of Dr. Latham, into 1. Mongolidae; 2. Atlantidae; 3. Japetidae. This writer is properly regarded as the chief living exponent of the science of E. in this country. Following in the track of Prichard, and possessing, like him, a considerable acquaintance with physiology and history, he distances him altogether in the department of comparative philology. His contributions to the science of E., borrowed from this particular branch of study, are consequently of the highest value. But there is one important question, with respect to which the suffrages of the best philologists are rather with Prichard than with Latham—viz., the origin of the Aryan or Indo-European race. Prichard, as we have seen, refers it to Asia, while Latham claims it for Europe.

Retzius's classification is based on the idea that the psychical individuality of a race is expressed by brain-development as indicated by the shape of the skull. He divides races into—I. Dolichocephalic, or long-skulled races, where the length of the skull is due to a lengthening of the posterior lobes of the brain, and II. Brachycephalic, or short, broad-skulled races, in whom the comparative shortness of these lobes causes them to be more developed in breadth. These are subdivided, according to the form of the face, into (1) orthognathous, or straight-faced peoples; e.g., Europeans; and (2) prognathous, or races with projecting jaws, e.g., Negroes. This classification laid the foundation of ethnographic craniology. Zeune divides mankind into—(1) races with high skulls, e.g., Indo-Europeans; (2) races with broad skulls, e.g., Mongols and some Malay tribes; (3) races with long skulls, e.g., Negroes. Such classifications err in grouping under the same divisions races between which it is otherwise impossible to establish any consanguinity. Passing over the wild speculative classifications of the modern German materialistic school, a specimen of which is that of Carl Vogt, who, assuming the ape origin of mankind to be an indubitable fact, describes three great divisions of the human race in correspondence with the three species of anthropomorphic apes found in Asia, Africa, and America, the only other very recent classification with pretensions to scientific reasonableness, is that of Prof. Huxley, which is founded on the hair as a race-character. He describes two primary divisions—I. Ulotrichi, crisp or woolly-haired people, with skulls longer than they are broad (dolichocephalic), and with the skin-color varying from yellow to black. Negroes, Bushmen, and Malays are subdivisions of this great group. II. Leiotrichi, or smooth-haired people, subdivided into (1) the Australoid group, with "dark eyes, wavy black hair, and eminently long, prognathous skulls, with well-developed brow ridges;" (2) the Mongoloid group, e.g., Chinese, Tartars, Polynesians, and American aborigines; (3) The Xanthocroic group, fair, blue-eyed people, e.g., Slavs, Teutons, Scandinavians, and fair, Celtic-speaking nations; (4) The Melanocroic group, or pale-skinned people, with dark hair and eyes, e.g. the Iberians, or "black Celts" of Europe, the inhabitants of the Mediterranean coast and of western Asia—a group resulting probably from intermixture of the Australoid and Xanthocroic races. Under the Australoid group is classed such apparently unrelated races as the Australians, the Dekhan tribes in India, and the ancient Egyptians; and curiously enough, col. Lane Fox has since shown that, from resemblances in the weapons, implements, etc., in use amongst these very races, Prof. Huxley's apparently startling views as to their affinity are not at all improbable.

A more important question is, what do classifications classify—species or varieties? Prichard held that mankind sprang from one stock, and constituted one species. Exist-

ing diversities in form and physique in races he accounted for by the influence of food, climate, and other circumstances operating through a long series of years. Mr. Darwin's recent work on *Animals and Plants under Domestication* powerfully corroborates this view, for it demonstrates that within the limits of one admitted species of animal there may be produced, by the operation merely of artificial selection and hereditary transmission of peculiarities, diversities infinitely greater than those existing between the highest and lowest races of mankind. Then, again, the highest and lowest human races interbreed, and their offspring is fertile, which would hardly be the case if the parents were of different species. Some have held that the difficulties of migration from an original center of creation were too great to be compatible with the wide geographical distribution of mankind. Yet even the South Sea islanders—and in their case the difficulties alluded to must have been greater than in most others—may have come to their present abodes by migration; for Japanese mariners have sometimes by stress of weather been driven from their course, and cast on the shores of islands in the South Seas. This doctrine of monogeny, or original unity of the human race, is supported by Dr. Latham with arguments drawn from philology. Dr. Latham, taking it as a matter of fact that all the languages of mankind have had a common origin, argues from it in favor of an original unity of race. This common origin of languages, however, is a thing by no means proved. "The idea of an original language of the whole human race," says Dr. Waitz (*Introduc. Anthropologie Naturvölker*), "is by science now regarded as a chimera." Admitting that Klaproth, Fürst, and Delitzsch have taken great pains to establish an affinity between the Sanscrit and the Hebrew, M. Renan and other excellent authorities regard the attempt as unsuccessful, and, even were it otherwise, "the Chinese," says a late writer (Farrar, *Essay on the Origin of Language*), "must always remain a stumbling-block in the way of all theories respecting a primitive language. Radical as is the dissimilarity between Aryan and Semitic languages, and wide as is the abyss between their grammatical systems, yet they almost appear like sisters when compared with the Chinese, which has nothing like the organic principle of grammar at all. Indeed, so wide is the difference between Chinese and Sanscrit, that the richness of human intelligence in the formation of language receives no more striking illustration than the fact, that these languages have absolutely *nothing* in common except the end at which they aim. This end is in both cases the expression of thought, and it is attained as well in Chinese as in the grammatical languages, although the means are wholly different."

Having thus made the reader in some degree acquainted with the views of Drs. Prichard and Latham on the subject of E., we now proceed to inform him of the totally different views and conclusions of the American school of ethnology. This school was founded by the late Dr. Morton of Philadelphia, an erudite and active man of science, who labored for many years in forming a collection of human crania of all nations, and of ancient as well as modern ages, with the design of still further carrying out Blumenbach's researches into the varieties of mankind by a comparison of crania, according to the method he had proposed. This collection of crania was begun in 1830, and at the time of Morton's death in 1851, amounted to the large number of 918 human crania, to which were afterwards added 51; and it, besides, included 278 crania of mammals, 271 of birds, and 88 of reptiles—in all 1606 skulls, being the largest collection of the kind ever formed, and which, fortunately for the purposes of science, is now deposited in the museum of the academy of natural sciences at Philadelphia. Simultaneously with this accumulation of crania, Dr. Morton carried on his researches in E., not, however, in the restricted sense in which he began, following Blumenbach's classification, but availing himself of the latest discoveries of Prichard, and the other English and continental writers. One of the results of his labors was the publication, in 1839, of a handsome work, entitled *Crania Americana*, which was followed in 1844 by the *Crania Egyptiaca*, in the collection of which he had been much aided by Mr. G. R. Gliddon. "In this work," says his biographer, Dr. Patterson, "Morton found himself compelled to differ in opinion from the majority of scholars, in regard to certain points of primary importance." The great question of the unity or diversity of mankind in their origin was one that early forced itself upon his attention, and the conclusion at which he arrived, after much patient investigation, was in favor of the latter view. He was slow to publish any opinion on the subject, probably reserving it for a work upon which he was engaged, to be entitled the *Elements of Ethnology*. His opinion, however, was well known to his friends. In a note to a paper in *Silliman's Journal* for 1847, he says: "I may here observe that whenever I have ventured an opinion on this question, it has been in favor of the doctrine of primeval diversities among men; an original adaptation of the several races to those varied circumstances of climate and locality which, while congenial to the one, are destructive to the other; and subsequent investigations have confirmed me in these views." In a letter to Dr. Nott, dated Jan., 1850, he lays down the following proposition: "That our species had its origin, not in one, but in several or in many creations, and that these diverging from their primitive centers, met and amalgamated in the progress of time, and have thus given rise to those intermediate links of organization which now connect the extremes together. Here is the truth divested of mystery; a system that explains the otherwise unintelligible phenomena so remarkably stamped on the races of men." His latest utterance upon the subject is contained in a letter written to Mr. G. R. Gliddon, in April, 1851, only a fortnight before the writer's



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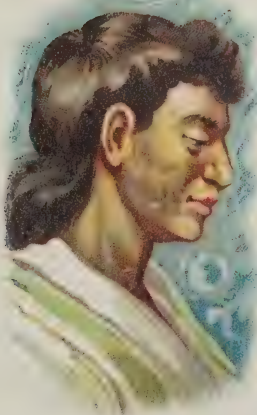
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17.



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18.

10. MEXICO.

11. HINDUSTAN.

12. CIRCASSIA.

13. CUBA.

14. CHINA.

15. HAWAII.

16. TASMANIA.

17. LAPLAND.

18. AUSTRALIA.

TYPES OF NATIONS.

decease, which concludes as follows: "The doctrine of the original diversity of mankind unfolds itself to me more and more with the distinctness of revelation." His views upon this and other points of dispute among ethnologists have been since embodied in a remarkable work, entitled *Types of Mankind; or, Ethnological Researches based upon the Ancient Monuments, Paintings, Sculptures, and Crania of Races, and upon their Natural, Geographical, Philological, and Biblical History: illustrated by selections from the inedited papers of S. G. Morton, M.D., and by additional contributions from Prof. L. Agassiz, W. Usher, M.D., and Prof. H. S. Patterson.* By J. C. Nott, M.D., and G. R. Gliddon (Philadelphia, 1854). In this composite work, perhaps the most remarkable feature is the paper contributed by the celebrated naturalist, Prof. Agassiz, in support of Dr. Morton's theory as to the original diversity of the human races.

The paper by Agassiz is entitled, *Sketch of the Natural Provinces of the Animal World, and their Relation to the Different Types of Man.* It was drawn up by the writer from a conviction that much might be gained in the study of ethnography by observing the natural relations between the different races of man and the plants and animals inhabiting the same regions. The sketch given by him is intended to show, that "the boundaries within which the different natural combinations of animals are known to be circumscribed upon the surface of our earth coincide with the natural range of distinct types of man. Such natural combinations of animals circumscribed within definite boundaries are called *Faunæ*, whatever be their home—land, sea, or water." There are eight regions of the earth, according to Agassiz, each containing its own faunæ, and its own peculiar type of man; and his main conclusion from a consideration of these several faunæ is as follows: "That the diversity among animals is a fact determined by the will of the Creator, and their geographical distribution part of the general plan which unites all organized beings into one great organic conception; whence it follows that what are called human races, down to their specialization as nations, are distinct primordial forms of the type of man." Messrs. Nott and Gliddon, in their work quoted, appeal triumphantly to this theory of Agassiz in support of their view as to the primitive diversity of the races of mankind; and in a subsequent work, *Indigenous Races of the Earth* (Philadelphia, 1857), have inserted a further communication from the writer, in which, while he reiterates his formerly expressed opinion, that the races of man, so far as concerns their geographical distribution, are subject to the same circumscription as the other members of the animal kingdom, he observes: "Even if this fact stood isolated, it would show how intimately the plan of the animal creation is linked with that of mankind. But this is not all. There are other features, occurring among animals, which require the most careful consideration, inasmuch as they bear precisely upon the question at issue, whether mankind originated from one stock or from several stocks, or by nations. These features, well known to every zoologist, have led to as conflicting views respecting the unity or plurality of certain types of animals as are prevailing respecting the unity or plurality of the origin of the human races. The controversy which has been carried on among zoologists upon this point, shows that the difficulties respecting the races of men are not peculiar to the question of man, but involve the investigation of the whole animal kingdom—though, strange as it may appear, they have always been considered without the least reference to one another."

This theory of Agassiz, it must be stated, is very generally controverted, as likewise the opinions generally of Dr. Morton and the American school of E., partly on biblical, but chiefly on scientific grounds. Indeed, from the conflict of opinions as to the origin of the human race, if the solution of this question were the sole object of anthropology, the science might be said to be in a very unsatisfactory state. But this is not the case. The question at issue is one that may well be left in abeyance for the present. Without it, the field of inquiry is sufficiently wide, and is well cultivated by skilled laborers, who continually bring the product of their researches in physiology, geography, archæology, and comparative philology to enrich and fructify the newly turned-up soil.

Subjoined is a tabular view of the different races of mankind, according to the useful, if not absolutely perfect classification of Dr. Latham: (many prefer Huxley's).

I. MONGOLIDÆ.

Physical Characteristics.—Face broad and flat; frontal profile retiring or depressed; maxillary profile moderately prognathic or projecting, rarely orthognathic; eyes often oblique; skin rarely a true white, rarely a jet-black; irides generally dark; hair straight, and lank, and black, rarely light-colored, sometimes curly, rarely woolly. *Languages*—aplotic and agglutinate, rarely with a true amalgamate inflection. See *PALÆOGRAPHY; PHILOLOGY.* *Distribution*—Asia, Polynesia, America. *Influence upon the history of the world*, material rather than moral.

A. *ALTAIC MONGOLIDÆ*.—1. *Seriform stock*, embracing Chinese, Thibetans, Anamese, Siamese, Kambojians, Burmese, the Môn, and numerous unplaced tribes. 2. *Turanian stock*, embracing the Mongolian branch, the Tungusian branch, the Turk branch, and the Ugrian branch.

B. *DIOSCURIAN MONGOLIDÆ*.—1. Georgians. 2. Lesgians. 3. Mizjeji. 4. Irôn. 5. Circassians.

C. *OCEANIC MONGOLIDÆ*.—1. *Amphinesian stock*, embracing Protohesians, Polyne-

sians, Malegasi (?). 2. *Kelanonesian stock*, embracing the natives of New Guinea, New Ireland, Solomon's Isles, Louisade, New Caledonia, Australia, and Tasmania.

D. HYPERBOREAN MONGOLIDÆ.—1. Samœids. 2. Yeniseians. 3. Yukahiri.

E. PENINSULA MONGOLIDÆ.—1. Koreans. 2. Japanese. 3. The Ainos. 4. Koriaks. 5. Kamskadales.

F. AMERICAN MONGOLIDÆ.—Embracing the various native tribes of North and South America.

G. INDIAN MONGOLIDÆ.—1. Tamul. 2. Pulinda. 3. Brahui. 4. Indo-Gangetic. 5. Purbutti. 6. Cashmirian. 7. Cingalese. 8. Maldivian.

II. ATLANTIDÆ.

Physical Characteristics.—Maxillary profile projecting; nasal, generally flat; frontal, retiring; cranium, dolichocephalic; the parietal diameter being generally narrow; eyes rarely oblique; skin often jet-black, very rarely approaching a pure white; hair crisp, woolly, rarely straight, still more rarely light-colored. *Languages*, with an agglutinate, rarely an amalgamate inflection. *Distribution*, Africa. *Influence on the history of the world*, inconsiderable.

A. NEGRO ATLANTIDÆ.—Embracing various negro tribes.

B. KAFFRE ATLANTIDÆ.—Kaffre tribes, etc.

C. HOTTENTOT ATLANTIDÆ.—1. Hottentots. 2. Saabs. 3. Dammaras.

D. NILOTIC ATLANTIDÆ.—1. Gallas. 2. Agows and Falasha. 3. Nubians. 4. Bishari. 5. M'Kuafi, etc.

E. AMAZIRGH ATLANTIDÆ.

F. EGYPTIAN ATLANTIDÆ.

G. SEMITIC ATLANTIDÆ.—1. Syrians. 2. Assyrians. 3. Babylonians. 4. Beni Terah (Edomites, Jews, Samaritans, etc.). 5. Arabs. 6. Ethiopians. 7. Canaanites, etc.

III. JAPETIDÆ.

Physical Characteristics.—Maxillary profile but little projecting; nasal often prominent; frontal sometimes nearly vertical; face rarely very flat, moderately broad; skull generally dolichocephalic; eyes rarely oblique; skin white or brunette; hair never woolly, often light-colored; irides black, blue, gray. *Languages*, with amalgamate inflections, or else anaplotic; rarely agglutinate, never aptotic. *Distribution*, Europe. *Influence on the history of the world*, greater than that of either the Mongolidæ or the Atlantidæ, moral as well as material.

A. OCCIDENTAL JAPETIDÆ.—Kelts.

B. INDO-GERMANIC JAPETIDÆ.—1. *European class*, embracing Goths, Teutons (Mæso-Goths, High and Low Germans, Franks), Scandinavians, Sarmatians, Slavonians (Russians, Servians, Illyrians, Bohemians, Poles, Serbs), Mediterranean Indo-Germans (Hellenic branch, Italian branch). 2. *Iranian class*, embracing Persians, Kurds, Beluchi, Patans (Afghans), Tajiks, Siaposh, Lugmani, Dardoh, Wokhan. 3. *Unplaced stocks*, Armenians, Iberians, Albanians. 4. *Extinct stocks*, Pelasgi, Etruscans, populations of Asia Minor.

ETHYL (symbol, C_2H_5) is the radical which forms the starting-point of the family group, of which ordinary ether and alcohol are members.

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| Ethyl, | C_2H_5 . |
| Ether, | $(C_2H_5)_2O$, oxide of ethyl. |
| Alcohol, | C_2H_5OH , hydrate of ethyl. |

Ethyl has not been prepared in the free state, but a polymeric body called diethyl, $C_2H_5 \cdot C_2H_5$ or C_4H_{10} , is formed by acting upon iodide of ethyl by granulated zinc, when it is liberated as a colorless, inflammable gas, of an agreeable odor, insoluble in water, but soluble in alcohol.

ETHYLAMINE is a substance strongly resembling ordinary ammonia or hartshorn in odor and other properties. It is found in coal-tar, in the oil obtained during the destructive distillation of bones, in the gases evolved during putrefaction, and may be produced by certain complicated chemical processes. E. is a mobile liquid of specific gravity 696 (water = 1000), and boils at $66^\circ F.$ ($18.9^\circ C.$). It has a strong ammoniacal odor, has an alkaline action with coloring matters, forms white fumes with strong acids, and in composition is analogous to gaseous ammonia, NH_3 or $NHHH$, with one of the atoms of hydrogen replaced by ethyl, C_2H_5 , and is represented by the symbol $C_2H_5 \cdot NH_3$. Like ammonia, it forms salts with acids.

ETHYLENE, **ETHENE**, or **BICARBURETED HYDROGEN**. See **OLEFIANT GAS**.

ÉTIENNE, St., an important manufacturing t. of France, in the department of Loire, is situated on both banks of the Furens, an affluent of the Loire, in the center of a valuable and extensive coal-field, 30 m. s.s.w. of Lyons by rail, and about 288 m. s.s.e. of Paris. It is surrounded by coal-mines, is seated upon coal-deposits, and has galleries driven even beneath its streets. The stream on which the town is built furnishes invaluable water-power to move its machinery, and its waters are also of great use for tempering iron and steel. The old town of St. E. is badly built, and the new town, which has sprung up very quickly, is destitute of architectural harmony. The newer



19.



22.



25.



20.



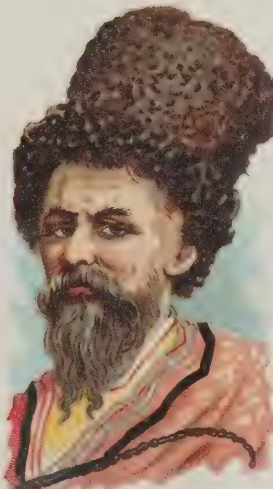
23.



26.



21.



24.



27.

19. AFRICA.

20. TURKEY.

21. GREECE.

22. SPAIN.

23. PERSIA.

24. TARTARY.

25. SCOTLAND.

26. TUSCANY.

27. ARABIA.

TYPES OF NATIONS.

houses are built of a fine white sandstone, and are frequently five and six stories in height; but they rapidly become tarnished and begrimed by the perpetual cloud of coal-smoke which hangs over the town. The most noteworthy building is the Hôtel-de-Ville, which contains the *Musée Industriel*, with specimens of the manufactures of the town, and of the minerals and fossils of the neighborhood. St. É. is famous for its manufactures of ribbons and firearms. The ribbon-manufactures comprise velvet and silk ribbons, trimmings, etc., the annual output being very extensive. They are unrivaled in elegance of design, and in richness and delicacy of color, and are exported to all parts of the world. There are extensive private manufactories of firearms, besides an imperial firearms manufactory, which supplies most of the muskets of the French army. St. É. has also extensive manufactures of bayonets, scythes, nails, saw-blades, foils, anvils, vices, files, naval and railway materials, and also of silks, velvets, lace, embroidery, muslins, glass, leather, chemicals, chocolate, india-rubber, sabots, paste-board and paper. The coal-field on which St. É. is situated, is very productive. On the 1st Jan., 1856, St. É. was constituted the capital of the department in place of the town of Montbrison. St. É. arose originally from a castle built in the 10th c. by the counts of Forez. It increased greatly in the 15th c., and in 1771 it had 20,000 inhabitants; in 1851, it had 49,614 inhabitants; in '72, it had 80,526; in '76, 117,537 inhabitants; and in '96, 136,030.

ETIQUETTE (Fr. a ticket, supposed to be from the Celtic *tocyn*, a little piece or slip—a token). Originally, E. signified a little piece of paper affixed to a bag or other object to indicate its contents. The word came probably to possess the secondary meaning which we now attach to it, of the forms or decorums observed in the intercourse of life, more particularly on state occasions, from its having been customary to deliver such tickets, instructing each person who was to take part in the ceremony as to the part which he was expected to play. The cards which are still delivered to the mourners at funerals, and those on which the order of the dances is set forth at balls and evening parties, are of this nature. Popular publications are constantly issuing from the press for the purpose of teaching E., or the rules of behavior in good society. They will, for the most part, be found far less trustworthy than the promptings of nature, where the individual possesses a reasonable amount of reverence for others, and respect for himself. Yet there are certain conventionalities which can only be learned by instruction of some kind, or by observation, and the observation may be attended with unpleasant circumstances.

ETIVE, a sea-loch in the n. of Argyleshire, running inland from the firth of Lorne, 20 m. e. and n.e., with a breadth of a quarter to three miles. It is bordered by granite in its upper part, and by trap in its lower. Near its mouth there is mica-slate on the n. side, and permian strata on the south. The river Awe, the outlet of loch Awe, falls into the loch at the bend, where also is the ferry of Bunawe, and the small river Etive falls into it at its n.e. end. The loch abounds in salmon. The scenery around the upper half of the loch is grand and romantic. To the e. rise Ben Cruachan, 3,670 ft., and Ben Starive, 2,500 ft., and to the n. Ben Mahrgage. The loch admits small coasting-vessels. Ardchattan priory, founded in the 13th c., on the site of a monastery of the 6th or 7th c., is now in ruins. Connel ferry, in the lower part of the loch, and near a vitrified fort, is only 680 ft. broad, and is a very turbulent cataract, 3 or 4 ft. high at half-tide, caused by a sunken reef of rocks, partly bare at low water. At the s. side of the mouth of loch E., 3 m. n. of Oban, on a projecting conglomerate rock 10 to 30 ft. high, are the ruins of Dunstaffnage castle, the ancient stronghold of the Macdougals, a building in what is called the Edwardian style of the end of the 13th or beginning of the 14th c., with walls 400 ft. in circumference, 30 to 50 ft. high, and 10 ft. thick, and with three round towers. Dunstaffnage is supposed by some to have been the seat of the Dalriadic Scottish monarchy (see DALRIADA), and from this place the famous slab or stone of destiny (*Lia Fail*), now in the coronation-chair, Westminster abbey, is said to have been taken in 843 by Kenneth Macalpine to Scone, whence Edward I. removed it to London.

ETNA, or **ÆTNA** (now MONTE GIBELLO), is the largest volcano in Europe. It is an isolated mountain, situated on the eastern coast of Sicily, and cut off from the chain of mountains which run parallel with the northern shore of the island, by a small valley, through which flows the Alcantara, and from the southern chain by a larger valley, which forms the basin of the Giaretta. Its eastern side rises directly from the Mediterranean, 30 m. of coast being formed by the streams of its lavas. Its base is almost 90 m. in circumference, and from this it rises like an immense cone to the height of 10,874 feet.

The history of E. does not carry us far back geologically; an active volcano in the later portion of the tertiary period, it continues still to pour forth materials; and the ejected ashes, dust, and lapilli, together with the streams of molten lava, have, in the course of untold ages, built up this immense mountain. One central crater has been the prevailing outlet for these materials, and they have consequently arranged themselves into one central and dominant mound—the cone-shaped E.; but innumerable secondary and surrounding craters, each forming, by its ejected matter, an external smaller cone, exist on Etna. Many of these, in the progress of the growth of the mountain, have been covered and hid by the more recent eruptions. Eighty of them may be

counted surrounding the upper portion of E., many being hills of considerable altitude, but all of them appearing only as trifling irregularities when viewed at a distance as subordinate points of so imposing and colossal a mountain. Seen from the summit, they present a beautiful aspect; some bare and barren, others covered with the dark and somber pine, or with the gayer and more varied foliage of the oak, the beech, and the hawthorn, and all arranged in picturesque groups of various heights and sizes. But the most remarkable feature in E. is the Val del Bove, an immense gully excavating the eastern flank of the mountain, 5 m. across, and surrounded by nearly vertical precipices from 1000 to 5,000 ft. high, on which are shown sections of innumerable lava-streams and beds of scoriæ, traversed by highly inclined dikes. It has a singularly dreary and blasted appearance.

The summit of E. rises considerably above the line of vegetation, and consequently presents, except where covered with snow, a dreary waste of black lava, scoriæ, and ashes, in the center of which, in a desolate plain, rises the crater-bearing cone. This is called the desert region. It is followed by 6 or 7 m. of the woody region, in which luxuriant forests of pine, oak, beech, poplar, and hawthorn abound, together with rich pasturage for herds and flocks. A varying breadth of from 2 to 11 m. of cultivated region surrounds the base of Etna. Its great products are corn, oil, wine, fruit, and aromatic herbs.

The first recorded eruption of E. took place 476 B.C. The most remarkable that have occurred since are the following: 1169 A.D., when Catania and 15,000 of its inhabitants were destroyed; 1527, in which two villages and many human beings perished; the eruption which continued at intervals from 1664 to 1673, and destroyed many villages with their inhabitants. Numerous chasms were formed at this time; from one several miles long and 4 or 5 ft. wide were emitted a bright light and strong sulphurous vapor; from another, black smoke and quantities of stones were given out; and from others, streams of lava. In 1673, an immense volume of salt (?) water rushed down the mountain: by some, it is supposed to have been ejected from the crater, but it is more probable that it arose from the sudden melting of the snows which covered the summit of the mountain. A very great eruption took place in 1852. Immense clouds of ash-gray dust were ejected. From two new mouths on the eastern flank there issued vast torrents of lava, one of which was 2 m. broad, and at one time as much as 170 ft. deep. The next outbreak, in 1864-65, was of trifling importance. That of May, 1879, was much more violent; the clouds of smoke and showers of ashes and scoriæ being followed by the ejection of a torrent of lava from 200 to 300 ft. in width, which desolated a large tract of highly cultivated land.

The minerals peculiar to volcanic rocks occur at E., such as chrysolite, zeolite, selenite, alum, niter, vitriol, copper, mercury, and spicular iron.

ÆTOLIA. See **ÆTOLIA.**

ETON, a t. in the S. of Buckinghamshire, on the left bank of the Thames, 42 m. s.s.e. of Buckingham, and 22 m. w.s.w. of London, near the Slough station of the Great Western railway. It lies opposite to Windsor, in Berkshire, with which it is connected by a bridge over the Thames. Though in separate counties, these two towns really form one. E. chiefly consists of one long well-paved street, and is mainly dependent on the college. Pop. '91, 2499, exclusive of the Eton boys.

ETON COLLEGE is one among the most famous educational establishments in England. It was founded in 1440 by Henry VI., under the title of "The College of the Blessed Mary of Eton beside Windsor." The original foundation consisted of a provost, 10 priests, 4 clerks, 6 choristers, 25 poor grammar-scholars, a master, and 25 poor infirm men. The king provided for the establishment out of his own demesne lands and the estates of certain alien priories. A supplementary charter was granted in 1441, in which year also the college buildings were commenced. Henry was very solicitous that the work should be of a durable kind. Some of the buildings were finished in 1443, and were handed over by the royal commissioners to the provost, clerk, and scholars. Political troubles of various kinds retarded the completion of the buildings till 1523. Bishop Waynflete was the first head-master, and afterwards a munificent supporter of the college. The institution passed through much peril in the reign of Edward IV., and again in the time of the commonwealth; but it surmounted the dangers, and the increasing value of its estates brought in a large income.

The original foundation has been greatly modified under the public schools act, 1868. It now consists of a provost and 10 fellows, who constitute the "governing body," 2 chaplains or conductors, and 70 scholars. The members of the governing body are nominated by the universities of Oxford and Cambridge, and other learned and responsible electors. Several valuable scholarships at King's college, Cambridge, are filled up every year from among the scholars by competitive examination. There are also other scholarships and prizes open to all the members of the school, such as the Newcastle and Tomline scholarships, and prizes for modern languages, founded by the late prince consort. The scholars are lodged within the college walls.

The main portion of the establishment, however, numbering nearly 900, consists of the *oppidans*, students who live out of the college, and whose friends pay liberally for their education. The tuition is the same for them as for the *collegers* or scholars.

There are an upper and a lower school, managed by the head master and lower master, with a large staff of assistants. Considerable discussion has taken place within the last few years concerning the kind of education received at Eton, the cost at which it is obtained, and the enormous incomes derived by some of the officials. The course of education is still somewhat of the mediæval character, which regards Greek and Latin as the basis of all good education; but mathematics and natural science, under recent regulations of the governing body, receive a large share of attention.

The chief buildings of the college consist of the chapel, the hall, the library, the schools, the provost's and master's apartments, and the lodgings of the fellows, surrounding two quadrangles; together with the boys' library and sleeping apartments, in a cluster called the new buildings, attached to the northern side of the older group. The chapel is mostly of stone, the other buildings of brick; and the effect of the whole is very picturesque, as seen from the terrace of Windsor castle, on the other side of the Thames. The chapel is an especially beautiful object.

ETOWAH, co. in n.e. Alabama, crossed by the Coosa river, and the Louisville and Nashville and other railroads; 510 sq. m.; pop. '90, 21,926, includ. colored. The surface is rough, with extensive forests and fertile soil. Productions, corn, cotton, wheat, etc. Co. seat, Gadsden.

ETRETAT, a watering place on the English channel in Seine-Inférieure, Normandy, about eighteen miles n.e. of Havre. Pop. 2000.

ETRU'RIA, TYRRHĒ'NIA, TU'SCIA, designated, at a period anterior to the foundation of Rome, nearly the whole of Italy, together with some of its most important western islands. Its northern part, from the Alps to the Apennines, was known under the name of Etruria Circumpadana; its southern, from the Tiber down to the gulf of Pæstum, or, according to some, to the Sicilian sea, under that of Etruria Campaniana; while the central portion, bounded on the n. by the Apennines and the river Macra, s. and e. by the Tiber, and w. by the Tyrrhenian sea, was called Etruria propria. The two first, however, did not long remain Etruscan territory, but were either reconquered by the surrounding tribes to whom they had originally belonged, or fell into the hands of new immigrants. No historical records of that brief period of any moment having yet come to light, they do not claim our attention; while Etruria proper, scanty though our information about it still be, deserves our interest in the highest degree. For its physical features, we refer the reader to Tuscany, Lucca, and the Transiberine portion of the present papal dominions; and have only to remark, that vast expanses of that country, which now are either covered with deep forest, or are shunned on account of the malaria, were in those times fruitful, densely peopled regions. For political, or rather administrative purposes, Etruria proper was divided into twelve sovereign cities, or rather cantons, among which the most important were Tarquinii (Corneto), the cradle of the royal family of the Tarquins, who at one time wielded the scepter of Rome; Cære (Agylla, Cervetri), which, during the war of Rome with the Gauls, offered a refuge to the Roman Flamen Quirinalis and vestal virgins; Veii, the greatest and most powerful city of Etruria, with 100,000 inhabitants, which carried on seven wars with Rome; Clusium (Kamars, Chiusi), the chief of which, Porsena, as principal commander of the Etruscan troops, dictated a humiliating peace to Rome after she had expelled the Tarquins; Perugia (Perugia), destroyed in the Perusian civil war (40); Arretium (Arezzo), birthplace of Mæcenas. Of other not sovereign places may be mentioned Luca (Lucca), Pisæ (Pisa), on the Arnus, with the Portus Pisanus, now Leghorn, and Florentia (Firenze, Florence), on the Arnus.

To what nation the inhabitants—called Etruscans (=Exteri, strangers) or Tuscans in the Roman, Tyrrheni or Tyrseni (*Turrēnoi*, *Tursēnoi*) in the Greek, and Rasena (Tesne Rasne) in their own language—originally belonged, and what country they came from, is a question which was debated many hundred years before Christ, and is not settled yet. All the most ancient writers, save one of the most trustworthy, Dionysius of Halicarnassus, implicitly follow Herodotus, who—confounding them, perhaps, as is his wont, with the Lydian *Turrēnoi*, or inhabitants of the city of Tyrrha—pronounces them to be Lydians, although there is not the slightest similarity between these two nations, and although Xanthus, the Lydian historian, knows nothing whatever about a fabled famine of eighteen years' duration in Lydia, followed by an immigration to Italy under a prince Tyrrhenus. Dionysius himself offers no opinion; he calls them an indigenous race—which means nothing; and it is surprising that some modern investigators should, despairing of a rational solution of the old riddle, have fallen back upon this evasive theory of "autochthons." Thucydides, in first mixing up the Torthebian pirates with the Pelasgian filibusters, gave rise to the most hopeless confusion about their very name. As to the innumerable theories and hypotheses that have been put forward since his day, we will only mention that while Ciampi and Collar hold them to be of Slavonic origin, Prérêt calls them Celts; Micali, Albanese; Lami, Pfizmaier, and Stickel, Semitics; and others variously make them Goths, Scandinavians, Basques, Assyrians, Phenicians, Egyptians, and Armenians. The most rational and generally accepted opinion is that of Niebuhr—modified more or less by Ottfried Müller, Lanzi, Lepsius, Steub—of their being, when they first appear in history, a mixture of an eastern tribe, which had settled for a while in the Rætian Alps (the Tyrol of to-day), and Pelasgians, whom

they found in their new Italian seats; these latter having, in their turn, since their immigration, mixed with the Umbrians, the oldest historical inhabitants of those parts. But, as we said before, this is only the most rational opinion that rose out of an ocean of wild speculation: so far from any authentic proofs having been brought forward in its support, the question stands to-day precisely where it stood when Dionysius wrote:—"The Etruscans do not resemble any people in language and manners."

Immense as was their influence on Roman, and, in fact, on European civilization, very little is known with respect to their political history. Chiefly cultivating the arts of peace, they still seem, long after their heroic period, to have been powerful enough to scare away any invader, and this probably is the reason why historians have so little to record of them; but their decline may be said to stand in an inverted ratio to the rise of Rome. The 7th and earlier half of the 6th c. B.C. had been the most powerful and flourishing epoch of the Etruscan state in its widest sense—which then probably had been in existence for four or five hundred years. Whether they had put their Tarquinius as governors over conquered Rome, or whether, on the contrary, the reign of this Etruscan family would denote the subjugation of Southern Etruria by Rome herself, is not quite clear; but the expulsion of the last Roman king, Tarquinius (Tarchon), called Superbus, was followed, about 507 B.C., by a war between the Etruscans, under Porsena of Clusium, and the Romans, which, although ending in a most ignominious peace, dictated within the walls of Rome, did not bring about the restoration of the Tarquinian dynasty. From the wars between Veii and Rome, which began in 486, and ended—interrupted only by an occasional armistice—395 B.C., with the destruction of Veii, dates the gradual but sure extinction of Etruria as an independent state. The Gauls advancing from the north, the Etruscans were forced to conclude a forty years' truce with their adversaries at any price; but these over, and the Romans being engaged with the Samnites, the Etruscans recommenced the hostilities more fiercely than ever. In the course of this last war, the Romans succeeded, 309 B.C., under Q. Fabius Maximus, in twice defeating them, and Fabius crossed the Ciminian forest—the frontier sacred from time immemorial; and when, 283 B.C., P. Cornelius Dolabella had beaten both them and their Gallic auxiliaries in a decisive and sanguinary battle at the Vadimonian lake, Etruria became a Roman province; and about two hundred years later, the Lex Julia conferred upon her inhabitants, as a reward for their fidelity, the right of citizenship. Up to that time, they had succeeded in keeping up their own singularly distinct creed, customs, traditions, language—their nationality, in fact; when Sulla, 82 B.C., infuriated by the part they had taken against him, liberally bestowed great portions of their land upon his veterans; and some fifty years later, Octavianus planted his military colonies there. This wrought and completed the transformation of that mysterious conglomeration of heterogeneous races and tribes, hitherto called Etrurians, into Romans. Once more, well-nigh 2,000 years after its extinction, the kingdom of Etruria (Hetruria) rose before the eyes of the world. The peace of Luneville re-created it, and conferred it on the hereditary prince, Louis of Parma; after whose death, his widow, the infanta Louisa of Spain, administered the government for their son, Charles Louis, up to 1807, when it became a French province. From 1809, it again bore the name of the Grand Duchy of Tuscany; and to TUSCANY—which in our days forms a province of the Italian kingdom, as it did of yore—and to ITALY, we refer for its modern history.

We have spoken above of twelve cities as forming the confederacy of Etruria proper. Similar confederacies of twelve cities were established, independently of each other, in the two other Etrurias. The cities themselves, however, cannot be fixed now in all cases. From the fact of more than twelve autonomous ones being recorded in Etruria proper, it would appear that some among these twelve confederates, or *populi*, possessed more than one capital city, each *populus*, however, being limited to one representative vote in the general council. The members of the confederacy were bound to appear regularly at an annual religious assembly near the temple of Voltumna, a locality which we are as yet unable to point out. Here great fairs were held for the people; common operations of war being discussed by the *principes*, and a general-in-chief for the ensuing year elected from their number. Each city or canton, in the earlier times at least, had a king (Lucumo, Lauchme=Inspired), chosen for life, who at the same time acted as high-priest; and a hereditary nobility, which alone was eligible to the higher offices of state. Next to them, in the political and social scale, came the people, properly so called—free, not subject personally to the nobility; lowest stood a great number of clients or bondmen, probably the descendants of subjected original inhabitants. On the whole, the federal interdependence between the cities was far from close. Single cities carried on wars in which the others took no part; and when the confederacy resolved on general action, there were always some members which, for some reason or other, stood aloof. It appears from this that the Etruscan constitution was analogous to the Greek and Roman in their earliest stages: the community develops itself into a *polis* or city, chooses a head, or rather high-priest, and enters into a more or less intimate alliance with its neighboring cities; but, beside that king of its own, recognizes a common chief only in time of war.

The Etruscans were, as a people, less warlike than any of their neighbors, especially the Romans, and conspicuous is their want of anything like cavalry. Theirs was also the un-Italic custom of hiring soldiers, and their energies seem principally to have been

directed to the more profitable occupations of trade and agriculture. One of the chief articles of their commerce was amber, which Germans brought from the Baltic to Etruria Circumpadana, whence it was conveyed to Greece by sea. In the western parts of the Mediterranean, they were formidable as pirates; while they were welcomed by the Carthaginians and the Greeks of Magna Græcia, as importers of indigenous products of nature and art, which they exchanged for the wealth of the east and south. That their commerce within Italy must have been very extensive, appears from the fact, that all the states of central Italy adopted their system of coinage, based, like their tables of weights and measures, and many of their political institutions, on the duodecimal system.

The striking contrast between the Etruscans and their Italic and Greek neighbors, which appears in the short thickset frames, the large heads and bulky extremities of the former, and the slender limbs and graceful harmony in the whole structure of the latter, and which runs with equal distinctness through the intellectual lives of the three nations, manifests itself nowhere with greater power than in their religions. Equally distant from the abstract, clear rationalism of the Latins, and the plastic joyfulness of Hellenic image-worship, the Etruscans were, as far as their dumb fragments show—for what we find on them of human words we do not understand—chained in a dark and dotard mysticism, such as a blending of a half-forgotten eastern symbol-service with barbarous religious practices of northern savages, grafted upon archaic Greek notions, might produce. In their pantheon, the predominance belongs to the evil, mischievous gods; their prisoners are welcome sacrifices to the heavenly powers; they have no silent depths where the “good spirits” of their departed dwell, but a hell of the most hideous description, and a heaven where permanent intoxication is the bliss that awaits the virtuous. They divide their gods into two classes, and they place them in the most northern, and therefore most immovable point of the world, whence they can best overlook it. The upper section is formed by shrouded, hidden gods (*Involuti*), of uncertain number, who act awfully and mysteriously, and twelve lower gods of both sexes, called *Consentes*, *Complices*. *Tinia* (*Zeus*, *Jupiter*) is the chief of these latter, and stands between the two divisions of the gods, receiving orders for destruction from the upper ones, while the lower ones form his ordinary council, and obey his behests. Nine of these (*Novensiles*) hurl lightnings at various times and with peculiar effects. The three of these deities which seem to have been the principal objects of worship were *Tinia* himself, armed with three different kinds of lightning, *Cupra* (*Hera* or *Juno*) and *Menrfa* (*Minerva*, *Pallas Athene*). Gods most peculiarly Etruscan are *Veiovis*, an evil *Jupiter*, whose thunder-bolts have the power to deafen, and *Nortia*, the goddess of fate, also called *Lasa Mean*. Besides these, they put a host of demons over the different portions of the creation:—the heavens, the earth, and the lower regions (*Penates*, *Lares*, and *Manes*). Their deities have generally wings; and before the Assyrian bulls had come to light, some antiquaries established from this a connection with the Hebrew winged cherubim. Characteristic in the highest degree is their “disciplina” or art of “divination.” This had been revealed by *Tages*, a grandson of *Jupiter*, who was dug out near *Tarquinius*, in the shape of a child-like dwarf with gray hair—a most striking caricature of these both childish and senile practices—and who died immediately after having communicated these mysteries. They were at first the property of the noble families; but in the course of time, as others were initiated, and schools for priests were founded, these mystical and awe-striking teachings came to be written down. It is saddening to observe here again in what monstrous insanities the spirit of man occasionally revels, and that, too, in the province of what is noblest and highest—religion. The “disciplina” was developed into an exact science, fully as minutely and casuistically sharpening its points and splitting its hairs as *Hindu* or *Mohammedan* theology would. It taught what gods hurled the different kinds of lightning; how, by the color and the peculiar quarter of the sky, the author of the bolt might be recognized; whether the evil denoted was a lasting or a passing one; whether the decree was irrevocable or could be postponed; how the lightning was to be coaxed down, and how it was to be buried. This was the specialty of the *Fulgurales*. The *Haruspices* had as their share the explanation of portents, prodigies, monsters, the flight and cries of birds, the entrails of sacrificial animals; while others ministered in the holy rites at the foundation of cities, the building of gates, houses, etc. Their ceremonies (a word derived from their town *Cære*) were endless and silly, but the show and pomp with which their priests knew how to surround these juggleries and from which the Romans largely borrowed, made them acceptable in the eyes of the herd; and although Rome herself, with all her augurs, called Etruria “the mother of superstition,” there was a certain odor of tithes and fees about these rites which made many anxious to “preserve religion in its primeval purity.”

In the entire absence of anything like a genuine Etruscan account, even the outlines of the relation between their religion and that of the Greeks on the one hand, and the Romans on the other, are exceedingly difficult to trace; so much, however, is certain, that they adopted and assimilated many points of archaic Greek theology, and clothed them in a garb of their own, and that this process was gone through and repeated still more completely by the Romans, in their turn, with respect to the religious notions of

the Etruscans. The articles on Greek and Roman religion will furnish further information on this point.

The high degree of civilization which the Etruscans possessed long before Rome was heard of, is testified by innumerable works of masonry and art. The Etruscans were of an eminently practical turn of mind, and domestic, like the north. Trusting to their priests for reconciliation with the gods, who always seemed irate, but whose angry decrees could easily be foreseen and averted, they set to work in developing the inner resources of the country, and in making the best use of their intercourse with foreign countries. They thus became eminent in agriculture, navigation, military tactics, medicine, astronomy, and the like; and in all these, as well as in some of the very minutiae of their dress and furniture, the Romans became their ready disciples and imitators. The division of the year into 12 months, of the months into kalends and nones and ides, the designation of the numerals, were Etruscan; from the same source were derived the *toga pretexta* as well as the pomp of triumphs, the *lictors* and *apparitors*, down to the ivory curule chairs. The towns of the Etruscans were clean and healthy, owing to their perfect system of drainage and sewerage; they tunneled and excavated, they embanked and irrigated, they turned swamps into cities, changed the course of streams, and excelled in all kinds of useful public and private works. Their ideal was not the beautiful or the spiritual, but a comfortable, and, if possible, luxurious existence. As a special proof of their love for their own hearth, a quality probably imported from the north, we might adduce their invention of the atrium, the common sitting-room of the family, where the master of the house sat surrounded by his penates and the figures of his ancestors, while the wife and her handmaidens plied the labors of the loom or the distaff. As in the Germanic nations, woman stood in high estimation. She was the companion, not the slave of the husband, and thus had certainly not a little share in the softening of their primitive wildness, and in counteracting the somberness of their creed. That we find them even in their tomb-paintings engaged in convivial carousings, dancing, races, athletic games, and that they liked their very worship accompanied by the sound of flutes, horns, and trumpets, only shows that that glorious sky of theirs, their intercourse with the nations, their wealth and culture, had gradually caused their antique and gloomy austerity to wear off, even as it wore off with the Romans and other peoples; for to assume with some that the boisterous scenes to which we allude were caused more or less by the despair arising from the loss of their independence, would be going somewhat too far. Licentiousness is the sure forerunner of the fall of a nation, but a whole people does not take refuge in enjoyment when their all is lost. We know little of Etruscan literature; it seems to have consisted mostly of rituals, religious hymns, and some historical works. Whether the Fescennines, certain mocking-songs, sung in alternate verses, with musical accompaniment, at nuptials, originated with them or not, is not decided.

We have alluded to the high proficiency of this people in architecture; they were, in fact, so renowned in this craft throughout the antique world, that, as Solomon called Phenicians to Jerusalem to build his temple, so the Romans sought in Etruria the framers of their grandest masonic structures, such as the Cloaca Maxima, the temple of Jupiter on the capitol, etc. The peculiarly fantastic, and, withal, powerful mind which speaks in all their institutions, equally pervades their architectural productions; but, at the same time, everything they built, they built either for practical or pious purposes. We cannot here enter into a discussion of their manner as it appears in various epochs, but it never reached anything like a distinct national completeness, their eagerness to profit by foreign examples not allowing them to develop it to the full unalloyed. Of their walls and gates, temples and porticoes, theaters and amphitheaters, bridges and sewers, gigantic, and, in the earliest times, cyclopean—evidently erected, in eastern fashion, by hosts of slaves—very little is extant in so complete a form as to give us an exact insight into their mode of construction; and were it not for their tombs, our knowledge would be exceedingly limited. These form one of the most peculiar features in Etruscan antiquities. Hewn in rocks, either below the ground or in the face of a cliff, they were adorned outside with a somewhat Egyptian façade of a temple or a house, which the insides themselves most exactly reproduce, with all their internal decorations, furniture, and utensils. Of the paintings which run round the walls, and which are our safest and most complete guides to the inner life of this nation, we will say more presently. We must not, in conclusion, omit to mention that their temples bore in primitive times, and always retained, in some measure, so far as we can judge, the unfinished character of the wood-buildings of northern mountain tribes—a square, half-house, half-fortification, overloaded with quaint ornamentation.

In their plastic and pictorial arts, Winckelmann has established three distinct styles—to which Dennis has added a fourth—viz., the Egyptian, with Babylonian analogies, the Etruscan or Tyrrhene proper, the Hellenic, and that of the *decadence*. Characteristic of the first style are the prevalence of straight lines, right angles, faces of an oblong, contracted oval, with a pointed chin, eyes mostly drawn upwards, the arms hanging close to the side, the legs close together, the drapery long, in straight parallel lines, the hair disposed in tiers of curls. In this style, the attitude is constrained, the action stiff and cramped. The progress shown by the second style is the greater attention bestowed on the delineation of the muscles, which swell out in disproportionate prominences on the

now almost entirely nude body. The two remaining styles explain themselves. Their statuary, as it appears chiefly on sarcophagi and cinerary urns, suggests likewise an Egyptian origin. The figures are those of their own mystical and awful Hades, instead of the Bacchic processions of Greece and Rome. The grouping follows rather a pictorial than a plastic principle; the motion is hasty and forced; but the features of the deceased, hewn on the lid, have all the rude accuracy of a spiritless portrait. Statues of deities in wood and stone have indeed been found, but very rarely. Of high renown were their ornaments and utensils in baked clay (*terra cotta*), in the manufacture of which objects the Veientes were especially famous. Rome, at a very early period, possessed of this material a quadriga and the statue of Summanus, made by Etruscans. Of the art of working in bronze, the Etruscans were supposed to be the inventors: that they brought it to a very high degree of perfection, is evident from the examples which remain to us. Statues and utensils were manufactured and exported in immense quantities, not only to Rome, but to every part of the known world. Of figures on a large scale still extant, we may mention the renowned she-wolf of the capitol, the chimera in the museum of Florence, the warrior of Todi in the Etruscan museum of the Vatican; a portrait-statue of an orator, with the inscription *Aule Meteli*, in Florence; and the boy with the goose at Leyden. The various objects of ornament and use, found in great numbers in tombs, such as candelabra, cups, tripods, caldrons, couches, disks; articles of armor, as helmets, cuirasses, etc.; musical instruments, fans, cists, or caskets, are most of them models of exquisite finish and artistic skill. Their gems are as numerous as those of Egypt, and like them, cut into the form of the *scarabæus* or beetle. They were exclusively intaglios, and of cornelian, sardonyx, and agate. On these the Etruscan artists represent groups from the Greek mythology, or the heroic cycle, bereft, as they seem to have been, of heroic legends of their own. They are most frequently found at Chiusi and Vulci, and were worn as charms and amulets. Special mention should be made of the metal *specula*, or mirrors, with figures scratched upon the concave side, the front or convex side being highly polished. These ranged over all the phases of Etruscan art, and are especially and peculiarly Etruscan. None but Etruscan inscriptions have ever been found upon them. They will, no doubt, prove eventually of the highest importance, not only by enabling us to follow the gradations of artistic development step by step, but by furnishing us with lists of names of gods and persons, and, it may be, of objects.

Of the vases and urns which are found in innumerable quantities in Etruscan tombs, we cannot treat here, as they are admitted on all hands to be, with very few exceptions, Greek, both in design and workmanship; we must refer the reader to the special article on VASES, but a few words may be added on the before-mentioned tomb-paintings. They are found chiefly in the cemeteries of Tarquinii and Clusium; and they are all the more important, as they lead us with minute accuracy from the very cradle of the individual, through the various scenes of his entire life, to its close; and this throughout the existence of the nation itself, beginning before the foundation of Rome, and ending in the empire; while we follow the style in its gradual development from the Egyptian to Græco-Roman perfection. Life in its merriest aspects gleams in the most vivid of colors all round—dancing, feasting, loving, hunting. The Etruscans of later times had learned in the school of the Hellenes to dread death less, and to think of the other world as one of continued joyfulness.

The Etruscan language is preserved in more than 3,000 inscriptions, and this number will no doubt be doubled by the opening of new sepulchral chambers, with which the soil of ancient Etruria is teeming. These inscriptions are found on sarcophagi, urns, vases, columns, statues, and looking-glasses in bronze. The latter article was a favorite object for the representation of scenes from Greek mythology, and from this source we learn the names of the principal native deities. *Tinia*, was Jupiter; *Usil*, the sun; *Fufuns*, Bacchus; *Sethlans*, Vulcanus; *Thurms*, Mercurius; *Turan*, Venus; *Thalna*, Juno; *Thesan*, Aurora. Some of the minor female deities are called *Lasa*, *Maris*, *Mean*, *Vanth*. The inscriptions are of two kinds—the archaic and more recent. The former, generally beginning with the syllable *MI*, are distinguished not merely by a more ancient form of the alphabet, but also by a more refined condition of the language. In the older inscriptions consonants and vowels are evenly balanced. But in the documents of a later date, short vowels are generally omitted, and in consequence, combinations of consonants appear which remind us strongly of the cacophonous forms of some of the Slavonic languages. Compare the following specimens: 1. *Mi Tesantiaia Tarchumenaia*. 2. *Laris Sesctna Lumsclal*.

With regard to the grammar, the following points may be considered as established. In the singular of nouns, the nominative ends in *s*; the genitive, according to the class of declension, in *a-s*, *e-s*, *i-s*, *u-s*; the dative in *si* or *s*. But these terminations are very often dropped, just as in early Latin. In the Cippus Perusinus, both the largest and best preserved inscription of all now in existence, we find of the proper names *Velthina* and *Afuna* the cases: *Velthina*, *Velthinam*, *Velthinas*; *Afuna*, *Afunam*, *Afunas*. The suffix *al* serves mostly, but not exclusively, for the expression of a metronymic. *Thana Seianti Latinial*, for example, is *Thana Seiantia*, the daughter of *Latinia*. Another very common suffix—*asa*, *esa*, *isa*, *usa*—designates the matrimonial relation of women. *Thana Aulnei Canznasa* is *Thana Aulnea*, the wife of *Canzna*; *Tha Setumnei Pumpunisa*

is Thana Setumneia, the *wife* of Pomponius. It is clear that this suffix consists of the genitives in *as, es, is, us*, with the addition of an *a*, so that grammatically and logically the wife is defined as part and parcel of her husband. Verbal forms do not occur often, but it is certain that the preterite is formed from the root by the addition of the syllable *ce*, like *tur-ce, the-ce, lupi-ce, sval-ce*. The numerals sound rather strange. *Mach, thu, zal, huth, ki, sa*, are 1 to 6; but as yet the individual meaning of each of these is unknown. The same must be said of *sesphs, esal, mu* or *muw*, the numerals for 7 to 9. Decades are expressed by *alch(a)*, e.g., *sespalchal, muwalchl, cealchl*. Ninety was probably *zathurms*. The meaning of about 10 or 12 words, such as *clan*, son; *sech*, wife; *avil*, age; *vril*, year; *hinthial*, spirit; *fleses*, statue, can be clearly established; but as yet no affinity has been discovered between these and the corresponding expressions in languages, whether Arian or otherwise. The following two inscriptions are given with a translation which in one or two points is conjectural:

Vipia Alsinai turce Versenas Caia.
Vibia Alsinæa dedit Versenæ, Caiæ filiæ.

The second is found on the celebrated bronze statue of the orator, now preserved in the museum of Florence:

Aulesi Metelis Ve Vestial clensi cen fleses tece
Aulo Metello Velie Vesie filio hoc signum posuit
sansl tenine tuthines chisulics.
jussu concilii publici magistratus (?)

The few bilingual inscriptions (altogether 15) throw no light on the language, as they contain only proper names. The so-called Tyrrhenian glosses, preserved in the lexicon of Hesychius, are worse than useless for critical purposes. See Dennis, *Cities and Cemeteries of Etruria* (1878); Isaac Taylor, *Etruscan Researches* (1885); Corssen, *Die Sprache der Etrusker* (1878). For illus. of architecture, etc., see *ENGINEERING*, vol. V.; *ARCHÆOLOGY*, vol. I.

ETRURIA, KINGDOM OF. A kingdom established in Italy by Napoleon I. in 1801, formed out of the province of Tuscany, and assigned by him to the Bourbons. In 1809, its status was changed so that it became a duchy, and part of the French empire. Napoleon's sister, Elise Bonaparte, wife of Col. Bacciocchi, was made Duchess of Etruria and Lucca and Princess of Piombino. On the overthrow of Napoleon in 1814 it reverted once more to the Austrian Grand-duke Ferdinand III., as the grand-duchy of Tuscany.

ETSCH. See *ADIGÉ*.

ETTLINGEN, the chief t. of the circle of Carlsruhe, Germany, on the railway between Manheim and Basel, $4\frac{1}{2}$ m. from Carlsruhe; pop. abt. 6000. It has manufactures of paper, cotton, starch, powder, etc. There is an old castle built on the site of a Roman fortress. Ettlingen was conquered in 1644 by Taupadel; and near the town, in 1796, Moreau was defeated by the archduke Charles. Roman antiquities are found in the neighborhood.

ETTMÜLLER, ERNST MORITZ LUDWIG, an able writer on German antiquities, was b. 5th Oct., 1802, at Gersdorf, in Upper Lusatia, and studied medicine at Leipsic from 1823 to 1826, but subsequently the language and history of his native country. In 1830, having taken his degree of *PH.D.* at Jena, he began to deliver lectures there on the German poets of the middle ages; in 1833, he was called to the Zürich academy, and in 1863, to the university there, as professor of German literature. E.'s literary activity found development chiefly in the editing of the literary remains of the Middle High-German, and older Low-German dialects. To the former belong his *Sant Oswaltes Leben* (Zürich, 1835); *Hadeloubes Lieder und Sprüche* (Zürich, 1840); *Heinrich's Von Meissen des Frowenlobes Lieder, Leiche, und Sprüche* (Quedlinb. 1845); *Frowen Helchen Süne* (Zürich, 1846); *Heinrich's Von Veldecke Eneide* (Zürich, 1852). Of poems composed in Low German he published, among others, *Theophilus* (Quedlinb. 1849); and *Wizlives IV., des Fürsten Von Rügen, Lieder und Sprüche* (Quedlinb. 1852). In 1850 appeared, under his editorship, an Anglo-Saxon chrestomathy; in the following year his much-valued *Lexicon Anglo-Saxonicum*. E. also gave his attention to the old Norse literature, as is shown by an edition of the *Völuspá*, translations, and a Norse reading-book. E. H. Müller also wrote several original poems: his *Deutsche Stammkönige* appeared at Zürich in 1844; his *Kaiser Karl d. Gr. und das Fränkische Jungfrauenheer* in 1847; and his *Karl d. Gr. und der Heilige Goar* in 1852. *Herbstabende und Sommernächte* are essays on his favorite subjects (3 vols., 1865-67). He d. 1877.

ETTRICK, a pastoral vale in the s. of Selkirkshire, watered by the Ettrick river, which rises amid bleak hills in the s.w. corner of this co. near Ettrick Pen, 2,258 ft. high, and runs 28 m. n.e., and falls into the Tweed. Its chief affluent is the Yarrow, which runs 25 m. from the w., through one of the loveliest of Scotch vales, and the scene of many a plaintive song. Ettrick forest, a royal hunting tract, swarming with deer till the time of James V., included Selkirkshire and some tracts to the north. In Ettrick Vale, at Tushielaw, dwelt the celebrated freebooter or king of the border, Adam Scot, who was summarily executed by James V. The district derives some note from two persons in modern times—Thomas Boston (q.v.), a Scottish divine, who was minister of the parish of E.; and James Hogg, the Scottish poet, who, having been originally a shepherd in this part of the country, became known as "the Ettrick shepherd."

"ET TU, BRUTE!" (Lat., "And thou also, Brutus!") The words are commonly believed to have been uttered by Julius Cæsar, when struck by the hand of Brutus. There is, however, absolutely no authority for attributing these words to Cæsar. The strong popular belief in their authenticity is a remarkable tribute to the genius of Shakespeare, who puts them into Cæsar's mouth at the moment of his fall. But Shakespeare did not originate them. They seem to have occurred for the first time in an old Latin play on the subject of Julius Cæsar, written by Dr. Eades, the master of Christ Church college, Oxford, in 1582, and acted in that year by the undergraduates. They next appear in the *Mirror for Magistrates*, in the narrative called *Cæsar's Legend*, and published in 1587. Again, they are found in a poem by one S. Nicholson, called *Acolastus his Afterwit*, which appeared in 1600. In his poem the lines run :

"Et tu, Brute ? Wilt thou stab Cæsar, too ?
Thou art my friend, and will not see me wronged."

Shakespeare probably found the words in *The True Tragedie of Richard, Duke of York* (1600), from which he drew "The Third Part of King Henry VI." In it is the line :

"Et tu, Brute ? Wilt thou stab Cæsar, too ?"

As Malone says, Shakespeare rejected the line in writing the play just mentioned, but it seems to have lingered in his memory and reappeared in the *Julius Cæsar* whence it passed into the stock of quotations that are the property of all mankind.

ETTY, WILLIAM, R.A. This distinguished artist was b. at York, Mar. 10, 1787. His father was a miller and spice-maker. Before he was 12 years of age, he was apprenticed to a printer, and served out his dreary term of seven years, the irksome drudgery of which he himself often afterwards was in the habit of narrating, occasionally soothed by dreams of, on some future day, being an artist. Freed at last, and assisted by some relatives, in 1805, at the age of 18, he entered on the study of art, and, after a year's probation, was admitted as a royal academy student. His career is very interesting and instructive. It exhibits one gifted with enthusiasm for art, high resolutions, and great industry and perseverance, for a series of years invariably surpassed by many of his fellow-students, and, as has been recorded, "looked on by his companions as a worthy plodding person, with no chance of ever becoming a good painter." Neither prizes nor medals fell to his share as a student; and for several years his pictures were rejected at the royal academy and British institution exhibitions. It was only after six years of hard study that he obtained a place for a picture in the exhibition of the royal academy; and his works only began to attract notice in 1820, when the artist was 33 years of age, and as he himself has said, "having exhibited nine years to no purpose." But the circumstance of E.'s genius being so long unappreciated, did not so much arise from his works evincing no talent, as from his class of subjects, and those technical qualities for which his works are remarkable, not being appreciated at the time; for long before his pictures were salable, his powers were highly appreciated by his professional brethren. On his return from Italy in 1822, where he had been studying the great Venetian colorists, he was elected an associate of the academy. In 1824, his *chef-d'œuvre*, "The Combat—Woman pleading for the Vanquished," was purchased by an artist, John Martin. In 1828, he was elected academician by the members of the royal academy; while in the same year the royal Scottish academy testified its high appreciation of his talents by purchasing the most important of his efforts, the historical work illustrating the history of Judith and Holofernes. Testimonials so high soon had their effect; E.'s pictures came into great request, and brought large prices, and he was enabled amply to repay those who, trusting to his energies, had assisted him when he entered on the contest, in which, after so arduous a struggle, he gained so much honor. He always cherished a love and reverence for York, his native city, and had retired there some time previous to his death, which took place on Nov. 30, 1849.

ETYMOLOGICUM MAGNUM, a Greek lexicon of unknown authorship, said to be the oldest extant in that language. It is thought to have been made in the 10th century.

ETYMOLOGY (Gr.) is that part of grammar that treats of the derivation of words. It embraces the consideration of the elements of words, or letters and syllables, the different kinds of words, their forms, and the notions they convey; and lastly, the modes of their formation by derivation and composition. Etymological inquiries have formed a favorite pursuit from the earliest times. In the book of Genesis, numerous indications are given of the derivation of proper names. Homer also attempts etymologies of the names of gods and men, which, however, can only be looked upon as more or less ingenious fancies. The grammarians of Alexandria and Varro among the Romans tried to base their etymologies on something like principle; but the wildest conjectures continued to be indulged in, and the results were little better than guess-work down to a very recent period. As philology extended its sphere, and became acquainted with the languages and grammarians of the east, who far excelled those of the west in this particular, etymology took on a new form. It no longer sought the relations of the words of a single language exclusively within itself, but extended its view to a whole group, e.g., the Teutonic, or wider still, to a whole family, as the Indo-European, or Aryan (q v.), and became a new science under the name of comparative grammar. See GRAMMAR; PHILOLOGY.

ETYMOLOGY, FIGURES OF, are deviations from the ordinary forms of words. *Apharesis* (Gk. a taking away) consists in taking away one or more letters from the *beginning* of a word, as 'neath for *beneath*, 'tis for *stis*, 'st for *est*. *Apocope* (Gk. a cutting away) consists in taking away a letter or letters from the *end* of a word, as *th'* for *the*, *tho'* for *though*, *tun'* for *tune*. *Diæresis* (Gk. a separating) is the separation of one vowel sound into two, as *Orphëus* (three syllables), instead of the usual *Orphëus* (of two syllables). This figure occurs chiefly in verse. See **PROSODY, FIGURES OF**. *Epenthesis* is the insertion of one or more letters in a word, as *alittum* for *alitum*, *Alcumena* for *Alemena*, *techina* for *techna*. *Metaplasm* is a general term used to denote any alteration made in the letters or syllables of a word. Such alteration may take place in three ways: first, by addition, which may be at the beginning (by *prosthesis*), in the middle (*epeuthesis*), or at the end (*paragoge*); second, by taking away from the beginning (*apharesis*), from the middle (*syncope*), or from the end (*apocope*), or by contracting the vowels (*synæresis*); third, by the transposition of letters (*metathesis*). *Metathesis* (Gk. a transposing) is the transposition of two letters, as *cretus* for *certus*, *pistris* for *pristis*, *centre* for *center*, and in the numerous other words whose final syllable exhibits this double form of *re* and *er*. *Paragoge* is the addition of one or more letters at the end of a word, as *withouten* for *without*, *vasty* for *vast*. So *dicier* was said to have been formed by paragoge from *dicti* by the addition of *er*. *Prosthesis* is the addition of a letter or letters at the *beginning* of a word, as *adown* for *down*, *bedecked* for *decked*. So, in the Greek *onoma* (Lat. *nomen*), the *o* is thought to be prosthetic. *Synæresis* (Gk. a taking together) consists in condensing two syllables into one, as *walk'st* for *walkest*, and in the numerous cases where a final *ed* is combined in pronunciation with the preceding syllable, as *hallowed*. *Synæresis* is the opposite of diæresis, and is identical with *synecphonesis* and *synizesis*. See **PROSODY, FIGURES OF**. *Syncope* (Gk. a striking together) is the omission of a letter from the middle of a word, as *fortnight* for *fourteen-nights*, *e'en* for *even*, *ne'er* for *never*, *ev'ry* for *every*.

EU, a tolerably well-built t. of France, in the department of the Lower Seine, in Normandy, situated near the mouth of the Bresle, 93 m. n.n.w. of Paris. It is remarkable for its fine Gothic church, and for the château d'Eu, a low building of red brick, with high tent-shaped roofs of slate. E. manufactures sail-cloth, ropes, soap, lace, and silk. Pop. '91, 4693. In the 11th and 12th centuries, E. was in the possession of the counts of the same name, a collateral branch of the Norman royal family. After various vicissitudes, it was purchased by Mademoiselle de Montpensier in 1675, whose fanciful taste has perpetuated itself in the architecture and decoration of the château. At a later period, it came into the possession of the duke of Maine, from whom it passed to the duke of Penthievre, the maternal grandfather of Louis Philippe, who succeeded to it in 1821. Louis Philippe expended large sums on the embellishment of the château, and especially on its magnificent park and the unique portrait-gallery. It has besides acquired a new historical association through the visits of the queen of England in 1843 and 1845. The eldest son of the duke of Nemours (born 29th April, 1842) received from his royal grandfather the title of Count d'Eu. Compare Vatout, *Le Château d'Eu, Notices Historiques* (5 vols., Paris, 1836), his *Résidences Royales* (Paris, 1839).

EU, Prince LOUIS PHILIPPE MARIE FERDINAND GASTON D'ORLEANS, Comte d', b. France, 1842, eldest son of duke de Nemours and grandson of Louis Philippe. In 1864, he was married to Isabel, heiress-apparent of the throne of Brazil. He was a marshal in the Brazilian army, and was commander-in-chief of the allied forces in the war with Paraguay in 1869. He defeated Lopez, and proclaimed the abolition of slavery in Paraguay. His unpopularity with the army was a powerful cause of the proclamation of the republic in 1889, after which he lived in France.

EUBŒA (ancient, *Euboia*; Turkish, *Egripo*; Ital. *Negroponte*), the largest island in the Ægean sea, forms a portion of the present kingdom of Greece. Until recently, it was called Negropont. It is bounded on the n. by the Trikeri channel, and on the w. by those of Talanta and Egripo. It extends in a direction parallel to the mainland; is 105 English statute m. long, and 30 m. in extreme breadth, although in one part its breadth is scarcely 4 miles. At the narrowest part, it is connected with the mainland by a bridge. The island is intersected by a chain of mountains, running n.w. and s.e., and attaining in the centre in the range of Mt. Delphi, an elevation of about 4,500 feet. Copper and other metals are obtained in the island, which also contains numerous hot springs. The pastures are excellent and the declivities of the mountains covered with forests of fir-trees. The climate is salubrious, the valleys well watered and very fertile, but little cultivated. The chief products are cotton, oil, wine, wheat, fruit, and honey. The inhabitants are chiefly engaged in the breeding of cattle; they export wool, hides, and cheese, as well as oil and grain. The chief towns are Chalcis (q.v.) on the n., and Carystos on the s. coast. The land on each side of the Egripo channel suffered from an earthquake in 1894. E. was peopled in the early historic times chiefly by Ionic Greeks, and afterwards by colonists from Athens, who formed a number of independent cities or states. These were at first monarchical in their constitution, but at a later period democratic. They soon rose to power and prosperity. After the Persian wars, however, E. was subjugated by the Athenians, under whose rule it continued till they,

in their turn, were subdued by Philip of Macedon. By the Romans it was finally united with the province of Achaia under Vespasian. In 1204 it came into the possession of the Venetians, and received the name of Negroponte. In the year 1470 the island was taken by the Turks, in whose hands it remained till 1821, when the inhabitants rose to vindicate their independence at the call of the beautiful Modena Maurogenia. It now forms with the Sporades a province of modern Greece.

EUCALYPTUS, a genus of trees of the natural order *myrtaceæ*, suborder *leptospermeæ*, containing a large number of species, mostly natives of Australia, and which, along with trees of nearly allied genera, form one of the most characteristic features of the vegetation of that part of the world. The genus occurs also, although much more sparingly, in the Malayan archipelago. The trees of this genus have entire and leathery leaves, in which a notable quantity of a volatile aromatic oil is usually present. The leaves, instead of having one of their surfaces towards the sky, and the other towards the earth, are often placed with their edges in these directions, so that each side is equally exposed to the light. Many of the species abound in resinous secretions, and are therefore called **GUM TREES** in Australia. Some of them attain a great size.

BOTANY BAY KINO, a secretion which is used in medicine as a substitute for kino (q.v.), is the produce of *E. resinifera*, a species with ovato-lanceolate leaves, known in Australia as the **RED GUM TREE** and **IRON BARK TREE**, a very lofty tree, attaining a height of 150–200 ft. When the bark is wounded, a red juice flows very freely, and hardens in the air into masses of irregular form, inodorous, transparent, almost black when large, but of a beautiful ruby red in small and thin fragments. Botany bay kino is said to consist chiefly of a peculiar principle called *eucalyptin*, analogous to tannin. About sixty gallons of juice may sometimes be obtained from a single tree, or, in the course of a year, as much as five hundred pounds of kino.—*E. robusta*, **STRINGY BARK TREE**, also a lofty tree, yields a most beautiful red gum, which is found filling large cavities in its stem, between the concentric circles of wood.—*E. mannifera* yields, from its leaves, an exudation resembling manna, less nauseous, and of similar medicinal properties. It contains a saccharine substance, different from *mannite*, from *glucose*, and from all previously known kinds of sugar. Another similar exudation, from the leaves of *E. dumosa*, is sometimes seen spread over large districts like snow, and used by the natives as food.—The Tasmanian blue gum tree, which is one of the eucalypti, has recently acquired great reputation for its effects in drying marshy soils, and in preventing malarious diseases. It is extremely rapid in its growth, which may account for its drying powers; and this, in its turn, may partly account for its salubrious effects; although its camphor-like odor may also have to do with it. It has been tried with decidedly beneficial effects in the cape of Good Hope, Algeria, the Roman Campagna, and California.

EUCHARIST. See **LORD'S SUPPER**.

EUCHLORINE is a very explosive green-colored gas, possessing bleaching properties, and is prepared by heating gently a mixture of 2 parts hydrochloric acid, 2 of water, and 1 of chlorate of potash. It explodes when merely touched with a hot wire, and is most likely composed of a mixture of chlorine and chlorochloric acid (2ClO_5 , ClO_5).

EUCHRE, a game of cards said to be of German origin, but now very popular as a social pastime in the United States. Thirty-two cards are used in E., the twos, threes, fours, fives, and sixes being rejected in a complete pack. Before the game is started the players cut for deal, which belongs to him who first draws a knave or the lowest card according to agreement. The non-dealer then cuts to his opponent, who deals five cards to each, by two at a time and three at a time or vice versa. The dealer turns up the top of the undealt cards for trumps. In suits not trumps the cards rank as at whist; in the trump suit the knave (termed the right bower) is the highest trump, and the other knave of the same color, either black or red (termed the left bower) is the next highest, this card being, of course, omitted from the suit to which it would otherwise belong. The other trumps rank as already stated, the queen being next above the ten. The best form of the game is when played by four persons, but two, three, or even more than four persons may play, if the rules be adapted accordingly. In two-handed euchre the non-dealer looks at his hand and decides whether he will play it. If he be satisfied and think he can make three tricks, he "orders up." The dealer then discards his lowest and least useful card, and is entitled to take the trump card into his hand; in this case, however, he must succeed in taking three tricks, or he is "euchred," and his opponent scores two points. If the non-dealer be not satisfied with his hand, he says "pass." The dealer then has the option of taking up the trump as before, or of passing also. If the trump be ordered up or taken up, the play of the hand commences; if both players pass, the dealer places the trump card face upwards underneath the pack, called "turning it down." The non-dealer has then the privilege of naming the suit which shall be trumps, which must be another than that previously turned up. If he "make" a trump, he must succeed in taking three tricks or he is euchred; but if he pass it again, the dealer has the option of making it. If both pass a second time, the hand is thrown up, and the other player deals. When the card turned up is red and

the trump is made red, it is called "making it next;" the same with black. If the trump be made of a different color from the turn up, it is called "crossing the suit." If the hand be played, the non-dealer leads; the dealer plays to the card led. He must follow suit if able, otherwise he may play any card he pleases. If the left bower is led, a trump must be played to it. The highest card of the suit led wins the trick; trumps win other suits. The winner of the trick leads to the next. If a player make all five tricks he scores a "march," equal to two points; if he make three or four tricks he scores one point. In three-handed euchre the option of playing or passing goes to each in rotation, beginning with the player to the dealer's left. Three cards, one from each hand, constitute a trick. The player who orders up, takes up, or makes the trump, plays against the other two, and if they succeed in euchring him, each of them scores two points. This is often termed "cut-throat euchre," because any one of the three players is liable to be opposed by the other two. Four-handed euchre is generally played with partners, who are cut for, and sit opposite each other as at whist; if a player have a strong hand he can decide to "play alone" single-handed against the two adversaries, and his partner cannot object. Should the lone player succeed in making a march he scores four; if he win three or four tricks he scores one; if he fail to win three tricks the opponents score two. The popularity of euchre in this country is due mainly to its simplicity and mirth-provoking qualities. It is played in many different ways, as the game is not bound by any strict set of rules. Sometimes a blank card called "little joker" or "the joker" is added, and is the highest card in the pack, the bowers following; sometimes it is agreed upon to allow the player who makes more than five points to carry the surplus (called a lap) to the next game; or to allow a "lone player" to call for his partner's best card.

EUCLASE, a silicate of alumina and glucina occurring in greenish crystals; it is hard, and will bear a high polish, but is fragile and not much used in jewelry. It is found in South America.

EUCLID, of Megara, a Greek philosopher, has often been confounded with the mathematician of the same name. He was one of the earliest disciples of Socrates. Although Megara lay at a considerable distance from Athens, and all Megarians were forbidden to enter the Athenian territories under pain of death, E. came into the city in the evening in female disguise, to enjoy the instruction of Socrates. After the death of his master, he established a school of his own, which received the name of the Megaric school. His death took place about 424 B.C. The basis of his system was in the Eleatic dogma of a one, only, universal substance or existence. Blending with this the Socratic idea of the predominance of the moral element, E. held this one real existence to be *the good*, though it receives various names under its special manifestations.

EUCLID, sometimes called the father of mathematics, was b. at Alexandria, about 300 B.C. We know little more of his history than that he belonged to the Platonic school of philosophy, and taught mathematics in the famous school of Alexandria, during the reign of Ptolemy Soter. Though he did not create the science of mathematics, as is sometimes represented, he made prodigious advances, especially by his rigorous method and arrangement. In this respect he has perhaps never been excelled, and his *Elements of Geometry* continue to the present day to hold their place as a text-book of that science. Besides the Elements, there are extant treatises on music, optics, data, etc., ascribed to E., the authenticity of some of which is doubtful. The best editions of the whole reputed works of E. are those of David Gregory (Oxf. 1703) and Peyrard (3 vols., Par. 1814-18). The oldest Greek edition of the Elements appeared at Basel, 1533; the best is that of August (2 vols., Berlin, 1826). Of English editions of E.'s Elements, those of Simpson and Playfair are considered the best. There is a full account of everything connected with E. and his works in Smith's *Dictionary of Greek and Roman Biography*; and in Ball's *History of Mathematics* (1888).

EUDIOMETER (Gr. *eudios*, good, and *metron*, measurer) is an instrument originally introduced as a measurer of the goodness of air in any locality, but which is now employed generally in the analysis of gases for the determination of the nature and proportions of the constituents of any gaseous mixture. The instrument is now made of glass in the form of a tube, which is hermetically sealed at one end, and open at the other. The tube may be straight, or bent in the shape of the letter U. In either case, the tube is graduated or marked off in equalized divisions from the closed end onwards, so as to admit of the volume of gas placed within being accurately measured; and two platinum wires are inserted through the glass near the shut end of the tube, and closely approach, but do not touch, each other. These wires are intended for the conveyance of electric sparks through any mixture of gases, so as to cause the combustion of certain of them. For the modes of manipulating with the eudiometer, see **GAS ANALYSIS** OF.

EUDO'CIA, the name of several Byzantine princesses, of whom the most important is the wife of the emperor Theodosius II. She was b. about 393, the daughter of the sophist Leontius, or Leon, and was educated by her father, who instructed her in the literature of Greece and Rome, in rhetoric, geometry, arithmetic, and astronomy. Her accomplishments and her singular beauty were reckoned by Leontius a sufficient fortune, for at his death

he left all his property to her two brothers. E. appealed to the emperor at Constantinople. Pulcheria, the sister of Theodosius, was interested in the maiden, and thought she would make a suitable wife for the emperor. But as E. (or, more properly, Athenais, for this was her name until her baptism) had been brought up a pagan, it was necessary first to convert her. This was easily accomplished. E. was married to the emperor in 421 A.D. For many years, however, Pulcheria ruled in the imperial household and councils, E., according to Nicephorus, "submitting to her as mother and Augusta;" but in 447, a quarrel broke out between them in regard to the Eutychian heresy, of which E. had become a supporter. At first, E. was triumphant, and Pulcheria was banished; but in a short time the emperor was reconciled to his sister, and treated E. so sharply that she retired to Jerusalem, where she died 460-61 A.D. Her latter days were spent in works of piety and charity. She enriched churches, rebuilt the walls of the holy city, and founded many monasteries and hospitals. Through the influence of the famous Symeon Stylites, she was induced to renounce Eutychianism, and become an orthodox Catholic Christian. E. was a poetess of considerable merit. She wrote a poem in heroic verse on the victory obtained by the troops of Theodosius over the Persians, 421 or 422 A.D.; a paraphrase of eight books of Scripture, a paraphrase of Daniel and Zechariah; and a poem in three books on the history and martyrdom of Cyprian and Justina. The authorship of *Homero-Centones* has also (but without sufficient reason) been attributed to her. This is a work composed of verses taken from Homer, and so arranged as to appear a history of the fall of man and of his redemption by Christ. It has been often published.

EUDOX US, of Cnidus, called by Cicero the prince of astronomers, flourished about 366 B.C. He studied under Plato for some time, and afterwards went to Egypt, where he resided for thirteen years, and had much intercourse with the Egyptian priesthood, from whom he is supposed to have derived his superior knowledge. His last years are said to have been spent on the summit of a high hill, that he might have the starry heavens ever before his eyes. There is little reason for believing that E. deserves any great admiration for his attainments in astronomy. He probably introduced the sphere into Greece, and may have corrected the length of the year, upon Egyptian information, but he appears to have been an indifferent observer of heavenly phenomena, and Delambre considers that he was ignorant of geometry. E.'s works are entirely lost, and our only reliable sources of information regarding him are the poem of Aratus and the commentary of Hipparchus.

EUFAULA, a city in Barbour co., Ala., on the Chattahoochee river, at the head of navigation, and on the Central of Georgia railroad; 80 m. e. s. e. of Montgomery. It is an important cotton manufacturing and shipping point; has gas and electric lights, water works owned by the city and completed in 1897 at a cost of \$60,000; Bluff park, city and railroad bridges over the river, Union female college and conservatory of music, several churches, national banks, and daily and weekly newspapers. Pop. '90, 4394.

EUGÈNE, FRANÇOIS (le prince François-Eugène de Savoie-Carignan), better known as Prince Eugene, distinguished as a general and as a statesman, was b. at Paris, 18th Oct., 1663. He was the son of Eugene Maurice, count of Soissons, and of Olympia Mancini, a niece of Cardinal Mazarin. He was intended for the church; but the banishment of his mother to the Low Countries, by the orders of Louis XIV., was so deeply resented by him, that he indignantly renounced his country, and entered the service of the emperor Leopold as a volunteer against the Turks. Subsequently, the French government made him the most flattering offers, but he never returned to the service of his native country. He displayed extraordinary military talent in the Turkish war, especially at the famous siege of Vienna in 1683, and soon rose to a high position in the army. In the coalition war against Louis XIV. in Italy, he took an active part; and in 1691, was raised to the command of the imperial army in Piedmont. On his return to Vienna, he was placed at the head of the army of Hungary, and defeated the Turks, with immense slaughter, in the famous battle of Zenta, Sept. 11, 1697. The booty obtained was almost incredible, amounting to several millions sterling. In 1701, broke out the Spanish war of succession. E. for two years commanded the army of Italy, but his forces were too small for him to accomplish anything of importance. In the year 1703, being appointed president of the council of war, he became thenceforth the prime mover of every undertaking. He first took the command of the imperial army in Germany, and along with Marlborough gained a brilliant victory at the battle of Blenheim, 13th Aug., 1704, when the two commanders defeated the French and Bavarian army. E. afterwards saved Turin, and expelled the French from Italy in the year 1706. He shared, too, with Marlborough the glory of the fields of Oudenarde (in 1708) and Malplaquet (in 1709); but being crippled in his resources by the retirement of Holland and England from the contest, he was unable to withstand the enemy on the Rhine, and his defeat by Villars at Danain, 24th July, 1712, was followed by other disasters, until the peace of Rastadt put an end to the war. In 1716, on the commencement of the war against the Turks, E. defeated an army of 180,000 men at Peterwardein, took Temeswar, and in the year 1717, after a bloody battle, gained possession of Belgrade. After the peace of Passarowicz, which was concluded in the following year, he returned covered with glory to Vienna, where, during the succeeding years of peace, he labored with unwearied energy in the cabinet. When the question of the succession to the throne of Poland brought on a new war with France, E. appeared

again on the Rhine; but being now advanced in years, and destitute of sufficient resources, he was unable to accomplish anything of importance. After the peace, he returned to Vienna, where he died, 21st April, 1736. E. was small in stature, with thin face, and long nose; he was simple in dress and manner, and indulged profusely in snuff. An enthusiast in his profession, and a strict disciplinarian, he was also kind-hearted and sympathetic, and always carefully attended to the wants of his men. He introduced no new tactics in the art of war, and was deficient in the guidance and command of masses; but by his rapidity of perception and decision, and faculty for making the best of existing circumstances, which was his *forte*, he raised the *prestige* of the Austrian arms to an eminence unequalled before or since his time. He successively served under three emperors, of whom he was wont to say, that in Leopold I. he had a father, in Joseph I. a brother, and in Charles VI. a master. E.'s political writings, published by Sartori, are important for the light they throw upon the history and manners of the time. Compare Dumont, *Histoire Militaire du Prince Eugene*; Ferrari, *De Rebus Gestis Eugenii* (Rome, 1747); Campbell's *Military History of Prince Eugene and the Duke of Marlborough*; and the monographs of Kausler (1838), Arneth (1858), Von Sybel (1861), and Pulitzer (1895).

EUGENIA, a genus of plants of the natural order *myrtaceæ*, nearly allied to *myrtus* (see MYRTLE), and differing only in having a 4-parted instead of a 5-cleft calyx, four instead of five petals, and a 1 to 2-celled berry, with one seed in each cell.

EUGÉNIE-MARIE DE GUZMAN, formerly empress of the French, was b. at Granada in Spain, 5th May, 1826, and is the second daughter of the count of Montijo and of Marie Manuela Kirkpatrick. She is descended, on the father's side, from an old and noble Spanish family, which, by marriages at various times, acquired the right to assume the names of Guzman, Fernandez, Cordova, La Cerda, and Levía, and contracted alliances with the noble families of Téba, Banos, and Mora. By her mother—also born in Spain, and the daughter of Mr. Kirkpatrick, who was for some time English consul at the Spanish seaport of Malaga—she is connected with an ancient Scottish family—the Kirkpatricks of Closeburn—which still exists, but no longer in possession of their original property. She was educated principally at Madrid, and spent a great portion of her youth in traveling with her mother, under the name of the countess of Téba. In 1851, she appeared at the *fêtes d'Elysée* in Paris, where her beauty and graceful demeanor attracted the notice and excited the admiration of the emperor of the French, who married her on the 30th Jan., 1853, at Notre Dame. On that occasion an amnesty was granted to 4,312 political prisoners. In 1859 the empress filled with ability the office of regent. During the war in 1870 she was again regent, but had to flee to England after the emperor became a captive, and afterward passed the greater part of her time at Camden House, Chislehurst, England. Her only son, the prince imperial, born 16th Mar., 1856, completed his military education in England, and was killed in 1879 while serving as a volunteer in the Zulu war. See De Lano, *The Empress Eugénie* (1894), and Comte d'Hérisson, *The Prince Imperial, Napoleon IV.* (1894).

EUGENIUS is the name of four popes, of whom the last is the most important. E. IV., a native of Venice, became pope in 1431. The great event in his career was the schism created in the church by the proceedings of the council of Basel, which had been convoked by E.'s predecessor, Martin V., and showed a strong tendency to ecclesiastical reform. E. was kept in perpetual trouble by this council, and at last, having been compelled to flee from Rome, opened a new council at Ferrara in 1438, and issued a bull of excommunication against the bishops assembled at Basel, whom he pronounced to be "a satanic conclave, which was spreading the abomination of desolation into the bosom of the church." The result was, that the council of Basel formally deposed him from his pontifical office in 1439, and elected in his stead Amadeus VIII., duke of Savoy, under the title of Felix V. The conduct of France and Germany seemed to warrant this bold step, for Charles VII. had introduced into the former country the decrees of the council of Basel, with some modifications, through the pragmatic sanction (1438), and the same thing happened in Germany by means of the deed of acceptance (1439). At the council of Ferrara, John Paleologus II., emperor of Constantinople, and upwards of 20 Greek bishops, presented themselves, and a union between the two great divisions of Christendom—the Greek and Latin church—was for a moment effected in July, 1439. Discord, however, broke out almost immediately, and the two have ever since remained separate. E.'s rival, Felix, did not obtain much recognition, and after the death of the former at Rome, in 1447, he had to give way in favor of Nicholas V.

EUGUBINE TABLES (Lat. *Tabulæ Eugubineæ*), the name given to seven bronze tablets, the inscriptions on which present a comprehensive and very remarkable memorial of the Umbrian language. They were discovered in 1444 at Gubbio (the ancient Iguvium or Eugubium), where they are still preserved. The characters on four of the tablets are Umbrian, on two Latin, and on one partly Latin and partly Umbrian. The language employed, however, is in all cases the same, and differs both from Etruscan and Latin, but resembles somewhat the older forms of the latter, and also the Oscan dialects, so far as we know them. The subjects of the inscriptions are directions concerning sacrificial usages and forms of prayer, and they seem to have been inscribed three or four centuries before the Christian era. Philip Buonarrotti first published them in a complete form in Dempster's *Etruria Regalis* (2 vols., Florence, 1723-24). The first really judicious attempt at interpretation was that of Lanzi, in his *Saggio di Lingua Etrusca* (3

vols., Rome, 1789), who points out the important fact that they related to sacrificial usages, etc. His views have been carried out by Ottfried Müller in his work *Die Etrusker*; Lepsius, *De Tabulis Eugebinis*, etc. The most accurate copy of the inscriptions is that given by Lepsius in his *Inscriptiones Umbrice et Osce* (Leip. 1841); the best and most complete work on the language and contents of the tablets is that of Aufrecht and Kirchhoff, entitled *Die Umbrischen Sprach und Denkmäler* (2 vols., Berlin, 1849-51.)

EUHEMERISM, the name usually applied to the historical theory of the origin of mythology advanced by Euhemerus, a native of Messene, and a contemporary of Cassander of Macedonia, in the fourth century B.C. According to this view, myths are history in disguise. All the gods were once men, whose real feats have been decorated and distorted by later fancy. In the course of a voyage to the Indian sea, Euhemerus professed to have discovered an island called Pauchia, in which he found inscriptions representing the principal gods of Greece as mere earth-born kings and heroes, deified after death for their superior strength or wisdom. His book, *Hiera Anagraphê*, as well as a Latin translation of it by Ennius, is lost. It drew upon him the charge of atheism, and its unblushing inventions made his name a by-word for mendacity. Its main theory, however, was adopted by many eminent men, including Polybius, as well as by some of the Christian writers—by Minucius Felix, Lactantius, and St. Augustine—who found the ground ready prepared for them in their effort to strip the pagan gods of the attributes of deity. Later Greek writers carried the theory still further, eliminating everything supernatural, and leaving only a string of tales perfectly credible and commonplace. Æolus became an ancient mariner with a special knowledge of the winds, Atlas a great astronomer, and Scylla a fast-sailing pirate. Euhemerism was a favorite theory of the philosophical historians of France in the eighteenth century, and the translation of Abbé Banier's work, *The Mythology and Fables of Antiquity explained from History*, extended it to England. To this school belong also writers such as Vossius, Bochart, and Huet, who find traces of sacred as well as profane history in Greek mythology. Thus, Saturn is identified with Noah, and his sons, Zeus, Poseidon, and Hades, with Shem, Ham, and Japhet. The latest and ablest exponent of sacred euhemerism is Mr. Gladstone, who sees in Zeus, Poseidon, and Hades, the dimmed figures of the Christian Trinity; in Apollo, the Jewish Messiah; and, in his mother Latona, the woman whose seed should bruise the serpent's head. Herbert Spencer is also an euhemerist in his explanation of the origin of religion. He bases all the religious emotions on primitive ancestor-worship, and explains totemism, a condition everywhere present in the savage world, as due originally to mere human nicknames, which were gradually forgotten, and afterwards came to have a sense of mystery connected with them. See ANCESTORS, WORSHIP OF.

EULENSPIEGEL is the hero of a *Volksbuch*, or German popular comic tale, often alluded to by various old authors, entitled the *Story of Tyl Ulenspiegel*, which relates the freaks, pranks, drolleries, fortunes, and misfortunes of a wandering mechanic. "It were long to detail his fearful jokes, which sometimes brought him to the gallows, yet saved him from the halter. He was buried with his coffin standing on one end at Möllen, near Lübeck; and you may see his grave under the great lime-tree in the churchyard, and his rebus, to wit, an owl and a looking-glass, cut upon the stone." Ulenspiegel, as he is sometimes called in German, has almost made the tour of Europe. His life was first published in the Nether-Saxon dialect, in 1483. Our English translation of *The merry jests of a man that was called Hecleglass, and of many marvellous things and jests that he did in his life in Eastland*, was "Imprinted at London in Tamestreete, at the Vintre, in Three Craned Warfe, by Wyllyam Copeland."

A High-German version, the work of Thomas Murner, the Franciscan monk, was printed at Strasburg in 1519. A Latin translation was made by Nemius, and numerous French translations have appeared of the book. An English edition was published in 1860, under the direction of Kenneth R. H. Mackenzie, and with illustrations by Alfred Crowquill. There is no complete copy of the original, but portions in the royal library at Vienna and the royal library at Berlin complement each other. See OWLGLASS.

EULER, LEONARD, one of the greatest of mathematicians, was b. at Basel, April 15, 1707, and received his first instructions in the science, for which he afterwards did so much, from his father, who was pastor of the neighboring village of Riehen. At the university of Basel, he studied under John Bernouilli, and was the friend of Daniel and Nicholas Bernouilli. At the age of 19, he was second in the contest for a prize offered by the academy of Paris for the best treatise on the masting of ships. His friends, the Bernouillis, had been called to St. Petersburg by Catharine I., when she founded the academy, and they now induced E. to settle in that capital, in 1730, as professor of physics. Three years later he exchanged his professorship for a place in the academy. From that time he continued to labor in the field of mathematics with an ardor really astonishing. More than half the mathematical treatises in the 46 quarto volumes published by the St. Petersburg academy from 1727-83 are by E., and at his death he left more than 200 treatises in MS., which were afterwards published by the academy. The Paris academy of science awarded him the prize on ten several occasions, one of which was his treatise on Tides, 1740. In 1741, he accepted the invitation of Frederick the Great to Berlin. He afterwards, 1766, returned to St. Petersburg,

where he was made director of the mathematical department of the academy, and died Sept. 7, 1783. The last years of his life were spent in total blindness.

E. was of an amiable and religious character, always cheerful and good-humored; in society, he was distinguished for his agreeable wit. It was doubtless his residence in St. Petersburg that led him to the application of mathematics to the building and management of ships, as embodied in his *Théorie de la Construction et de la Manœuvre des Vaisseaux* (Petersb. 1773). The great problems left by Newton to his successors were the objects of his unceasing research. On physical subjects, E. often adopted extremely untenable hypotheses. He occupied himself also with philosophy in the proper sense of the word. He undertook to prove the immateriality of the soul, and to defend revelation against freethinkers. In his *Lettres à une Princesse d'Allemagne sur quelques Sujets de Physique et de Philosophie* (3 vols., Berl. 1768; new ed., Par. 1812; and which have also been translated into English), he attacked Leibnitz's system of monads and of a pre-established harmony. But this was not the field in which he was best calculated to shine; his proper domain was the abstruser parts of pure mathematics. His most important works of this class are his *Theory of Planetary Motion*; *Introduction to the Analysis of Infinites*; *Institutions of the Differential and of the Integral Calculus*; and *Dioptrics*; which are all, as well as his *Opuscula Analytica*, in Latin. His *Introduction to Algebra* is well known.

EUMENES, 360–316 B.C.; a native of the Thracian Chersonesus; private secretary to Philip of Macedon, and also to his son Alexander the Great, under whom he was a commander of the cavalry. After Alexander's death, the provinces and armies were divided among his generals, and the countries assigned to Eumenes were Cappadocia and Paphlagonia, with the sea-coast of Pontus as far as Trapezus; but as they were not yet subdued, Leonnatus and Antigonus were charged by Perdiccas to put Eumenes in possession. Antigonus disregarded the order, and Leonnatus, having in vain endeavored to induce Eumenes to accompany him to the assistance of Antipater in Europe, made an unsuccessful attack on Eumenes's life. But Eumenes escaped and joined Perdiccas, who assisted him in getting possession of Cappadocia. He did not rule long, having the enmity of many powerful generals. He was betrayed by his own soldiers, and put to death.

EUME'NIDÉS (literally, the well-minded or benign goddesses) was the euphemistic name of certain fearful beings, whose true name of Erinnyes (from *erino*, I hunt up, or *eruno*, I am angry) it was considered unlawful to utter. Their Latin name was *furie* or *diræ*. We find them mentioned by the earliest poets, and they play a prominent part in the writings of the tragedians, where their sphere of action is much extended. In the earliest times, Homer and Hesiod represent them as avenging and punishing perjury and murder, as also the violation of filial duty and of the rite of hospitality; they were also regarded as goddesses of fate (like the *Parcæ*) and had a share in the grim providence which led the doomed ones into the way of calamity. A part of their function was also to hinder man from acquiring too much knowledge of the future. In these poets, their number is sometimes undefined; sometimes they appear as one. The limitation to the number three, as well as their names Alecto, Megæra, and Tisiphone, is of a later period, a whole chorus of Erinnyes appearing in the writings of Æschylus. According to Homer, they dwell in Erebus, and with this the duration after death of the punishments which they inflict is connected. Hesiod calls them the daughters of Ge and Uranus. Æschylus describes them as having the features of gorgons and harpies, their bodies covered with black, serpents twined in their hair, and blood dripping from their eyes. The later poets and sculptors represented them in the more pleasing form of winged virgins, attired in the garb of huntresses, bearing torches in their hands, and with a wreath of serpents round their heads. Gradually, they came to be considered goddesses of the infernal regions, who punished crimes after death, but seldom appeared on earth. In Athens, their worship, which, like that of the other infernal deities, was conducted in silence, was held in great honor. The sacrifices offered to them were black sheep and libations of *nephalia*—i.e., honey mixed with water. The turtle-dove and the narcissus were sacred to them. They had a sanctuary in the vicinity of the Areopagus, and one at Colonus.

EUMOLPUS (the "sweet singer") was, in the later mythology of Greece, the son of Poseidon and Chione. He was brought up in Ethiopia, whence he went to Thrace, and afterwards passed into Attica, at the head of a body of Thracians, to assist the Eleusinians in their war against Erechtheus, king of Athens. E. and his sons are said to have been slain in battle. He is spoken of as the founder of the Eleusinian mysteries. A distinction is made by some of the ancient writers between this E. and a son of Musæus bearing the same name. The latter is represented as a scholar of Orpheus, and the instructor of Hercules; but E.'s history, like all mythological stories, is involved in great obscurity and confusion. The name of E. is one of the series of those old priestly singers who, by the institution of religious ceremonies, spread culture and morality among the rude inhabitants of Hellas. An illustrious Athenian family, the *Eumolpidae*, derived their descent from E., and held the office of priests of Demeter in Eleusis.

EUNATIUS, b. 347 A.D. ; a Greek sophist, and enemy of Christianity. He possessed some knowledge of medicine, and was a teacher of rhetoric at Athens. He wrote *Lives of the Sophists*, and a continuation of the history of Dexippus.

EUNOMIUS, the founder of the Arian sect of Eunomians, was b. in the village of Dacora, in Cappadocia, and was first a lawyer, then a soldier, and ultimately took holy orders. In 360, he was appointed bishop of Cyzicum. In the great controversy regarding the nature of the Trinity which raged during the 4th c., E. was conspicuous by his advocacy of the view that the Father alone was eternal and supreme; that the Son was generated of Him; and the Holy Spirit, again, of the Son. His doctrine of the Trinity is sometimes called the *anomoian* ("dissimilar"), to distinguish it, on the one hand, from the *homoiousian* ("similar"), held by the semi-Arians, and, on the other, from the *homoousian* ("identical"), held by the Athanasian or Trinitarian party. It was thus the extreme of Arianism. In defense of his peculiar views, E. is said to have shown superior ability, although his opponents also accuse him of being verbose and inflated in his style. His life was much checkered. He was banished from one place to another, until at length he obtained permission to retire to his native village, where he died in 394. His writings have entirely perished, with the exception of a fragment here and there preserved in the writings of his adversaries.

EUNOMIUS, b. Cappadocia, early in the 4th c. ; leader of a sect of Arians who took his name. He was bishop of Cyzicus in 360, but was afterwards deposed for heresy by the bishop of Antioch. His writings were held in high esteem by his followers, and were so much dreaded by the orthodox that more than one imperial edict was issued for their destruction. His heresy was formally condemned by the council of Constantinople.

EUNUCH. The original signification of this word (Gr. *eunuchos*, one who has charge of a bed) points to the office that this class of persons fulfilled, and still fulfill in the east—that, namely, of taking charge of the women's apartments or harems. The barbarous practice of employing castrated males as guardians of the other sex, is an accompaniment of polygamy, and is therefore chiefly met with in the east and in n. Africa. If it has appeared in countries where monogamy was the law, it was in consequence of the introduction of oriental luxury, as was the case under the Roman emperors. The practice is of great antiquity, and seems to have originated in Libya, and from that to have spread to Egypt and the east. Syria and Asia Minor were the most notorious in this respect. In Greece, it never obtained any great footing; for although Greek women were kept in seclusion, polygamy itself never prevailed. The later Romans kept eunuchs, but they were mostly imported. In the Byzantine empire, on the contrary, castration and keeping of eunuchs were very prevalent. This class played a prominent part in the court of the eastern empire, and the word E. came to be the title of an office similar to that of chamberlain. In modern times, the practice is mostly confined to Mohammedan countries, and the eunuchs are chiefly brought as slaves from the interior of Africa. See CASTRATION.

EUOMPHALUS, a large genus of fossil gasteropodous shells, characterized by its depressed and discoidal shell, with angled or coronated whorls, five-sided mouth, and very large umbilicus. The operculum was shelly, round, and multi-spiral. The genus seems related to *trochus*. It appears among the earliest tenants of the globe, and keeps its place till the triassic period. No less than eighty species have been described.

EUONYMUS. See SPINDLE TREE.

EUPATORIA (formerly *Koslov*), a thriving maritime t. of Russia, in the government of Taurida, is situated on a bay in the w. coast of the Crimea, 15 m. n.w. of Old Fort, and 38 m. n.w. of Simferopol. The town stands on the border of a monotonous pastoral steppe, and is surrounded by low hills. Seen from the sea, it presents, with its occasional minarets and its houses roofed with red tiles, a somewhat picturesque appearance. The principal building is the Tartar mosque, built by Devlet-Ghiri Khan in 1552, and reckoned the finest in the Crimea. E. exports corn, wool, and salt. Its harbor is shallow, and is sheltered only from the n. and n.e. winds. Pop. abt. 17,350, mostly Crim-Tartars and Jews, who are engaged chiefly as farmers and shepherds, and possess an immense number of oxen and sheep, and a large area of badly cultivated land.

On the 14th Sept., 1854, a portion of the Anglo-French invading army landed here, and occupied and fortified the town. It was also the scene of a battle between the Russians and Turks, 17th Feb., 1855, in which the latter were victorious.

EUPATORIUM, a genus of plants of the natural order *composite*, sub-order *corymbifera*, having small flowers (heads of flowers) in corymbs, florets all tubular and hermaphrodite, club-shaped stigmas, imbricated bracts, a naked receptacle, and a hairy pappus. The species are numerous, and mostly American. One only is British, the common HEMP AGRIMONY (*E. cannabinum*), a slightly aromatic perennial plant, growing mostly in marshy places, and on the banks of streams. The root was formerly employed as a purgative, and the plant was also used as a diuretic and as a vulnerary. —THOROUGH-WORT (*E. perfoliatum*), a species having the opposite leaves joined at the base, is very common in low grounds in North America, and is a popular medicine,

much esteemed and used in this country. It is often administered in intermittent fevers. It acts powerfully as a sudorific, and is often very beneficial in catarrh and influenza. It is also emetic and purgative, and, in small doses, tonic. The whole plant is very bitter.—Other North American species possess similar properties, and the root of one, known as GRAVEL-ROOT (*E. purpureum*), is employed as a diuretic for relief of the disease from which it derives its name.—The AYAPANA (*E. ayapana*), a half-shrubby species, native of the n. of Brazil, has a high reputation in that country as a cure for snake-bites, and has been introduced into the East Indies. It is a very powerful sudorific, and is also diuretic.—The famous Peruvian vulnerary, MATICO, has been referred, but uncertainly, to a shrubby species of this genus, *E. glutinosum*.—GUACO or HUACO, much valued in Peru as a cure for snake-bites, is supposed to belong to the allied genus *mikania*.

EUPEN, a flourishing manufacturing t. of Rhenish Prussia, is situated in a beautiful valley on the Weeze, within 2 m. of the Belgian frontier, and 9 m. s.s.w. of Aix-la-Chapelle. It is well built and open, including within its limits several gardens and meadows. E. is known for its extensive woollen manufactures, and has a variety of other industries. It owes the prosperity of its manufactures chiefly to a number of French refugees, who settled here after the peace of Lunéville. It was a part of the Duchy of Limburg till the treaty of Lunéville (1801), by which it was ceded by Austria to France; but it was gained from the latter power by Prussia in 1815. Pop. '90, 15,445.

EUPHEMISM (Gr. *eu*, well, and *phemi*, I speak) is a figure of rhetoric by which an unpleasant or offensive matter is designated in indirect and milder terms. Thus, instead of directly calling up an unpleasant image by the word *died*, we say, "he was gathered to his fathers." The ancients used a multitude of euphemisms, to avoid words that were thought to be ominous of evil, or offensive to the unseen powers. They spoke, for example, of the Eumenides, or "benign goddesses," instead of the Furies; just as the elves and fairies of modern superstition are spoken of as "good neighbors."

EUPHON, or **EUPHONON**, a musical instrument invented by Chladni in 1790. It is similar in tone to the harmonica, and, like it, the tone is produced from the sounding body by the finger direct, without mechanism, and is regulated in quality and effect by the taste and feelings of the performer, who can produce tones from the most delicate pianissimo to fortissimo. In 1822, Chladni exhibited an improved E. of which a detailed description is given by himself in the Leipzig *Musik-zeitung* of that year, p. 805.

EUPHORBIA, OIL OF, or OIL OF CAPER SPURGE, an extremely acrid fixed oil, obtained by expression, or by the aid of alcohol or ether, from the seeds of the caper spurge (*euphorbia lathyris*), a plant common in many parts of Europe, and naturalized in some places in America. See SPURGE. Oil of euphorbia has much resemblance to croton oil in its properties, although less powerful, and is sometimes used as a substitute for it, in doses of from three to ten drops. It is good for use only when recently extracted.

EUPHORBIA CEE, a very extensive natural order of exogenous plants, containing upwards of 2,500 known species—trees, shrubs, and herbaceous plants. They abound chiefly in warm countries, and most of all in tropical America. The few species found in the colder parts of the world are all herbaceous. The common box reaches a more northern limit than any other shrubby species. The other British species are different kinds of spurge (*euphorbia*) and dog's mercury (*mercurialis*). The E. usually abound in an acrid and poisonous milky juice; although there are species of which the juice is bland or becomes bland through the application of heat, so that their leaves may be used as food. The leaves in this order exhibit great diversities. The inflorescence is also various. Amongst those most remarkable for the acidity of their juice are the MANCHINEEL (q.v.) and *cacæaria agallocha*, an East Indian tree—formerly supposed to yield one of the kinds of aloes-wood—the smoke from the burning of which is extremely dangerous to the eyes. The juice of many of the spurges is also very acrid. Many of the E. are valued for their medicinal properties, different parts of the plant being in some instances employed, and in some the resins and oils which they yield. Thus the juice of some of the spurges, the roots or bark of the roots of others, the bark of different species of *croton* (cascarilla bark, copalche bark), etc., are used in medicine; and to plants of this order we are indebted for euphorbium, oil of euphorbia, castor oil, croton oil, etc. A few of the E. yield balsamic products of exquisite fragrance (see CROTON); a few, although their juice is poisonous, yield a wholesome starch in considerable abundance (see MANIOC); a few are cultivated and used as pot-herbs, particularly species of *plukenetia* in the East Indies; a few yield wholesome and agreeable sub-acid fruits, as *cicca disticha* and *C. racemosa* in the East Indies; the seeds of some are eatable, as those of the candle-nut (q.v.), of *omphalea diandra*, a Jamaica tree, and of *conceveiba Guianensis*, the latter being esteemed particularly delicious; the oil of the seeds is also in some cases used for food, like other bland oils (see CANDLE-NUT); but more frequently it is used for burning, as castor oil, candle-nut oil, the oil of *elaeococca verrucosa* in Japan and Mauritius, and the concrete oil of *stillingia sebifera*, which is used in China for making candles, and in medical preparations as a substitute for lard.

—The dye-stuff called Turnsole (q.v.) is obtained from a plant of this order; and a bright red is imparted to silk by the roots of *rottlera tinctoria*, a native of Circassia, and by a red powder with which its seed-vessels are covered. The timber of some of the E. is valuable. African teak (q.v.) belongs to this order. The red-colored wood of *stylo discus trifolius* is used in Java for making masts. Some of the E. are often cultivated in gardens and hot-houses, more frequently for their curious appearance than for their beauty; but the large deep crimson bracts of *poinsettia pulcherrima*, a native of Madagascar, make it a very attractive plant.

EUPHORBIA, an extremely acrid gum resin, obtained from several species of *euphorbia* or Spurge (q.v.), as *E. officinarum* and *E. antiquorum*, in the n. of Africa, Arabia, and the East Indies, and *E. canariensis* in the Canary islands. It is obtained by incisions in the branches, whence issues a corrosive milky juice, which dries in the sun, and becomes a yellowish-gray waxy gum resin. The persons who collect it are obliged to defend their mouths and nostrils by a cloth, as its particles produce incessant sneezing, violent inflammation of the nostrils, and a very painful burning sensation in the mouth. On account of its excessive acridity, it is now less used in medicine than formerly; although it is still occasionally mixed with burgundy pitch or other substances to make rubefacient plasters for chronic affections of the joints; its alcoholic tincture is used as a caustic in carious ulcers, and its powder, mixed with much starch or flour, as an *errhine* in chronic affections of the eyes, ears, or brain. It was formerly administered as an emetic and drastic purgative, but is dangerously violent in its action.

EUPHRANOR, a sculptor and painter of Greece in the 4th c. B.C. One of his finest works in sculpture was a figure of Paris, a copy of which is in the Vatican. His chief painting was extant at the time of Pausanias. It represented on one wall of a temple the twelve gods, and on the other wall Theseus as the founder of the equal polity of Athens.

EUPHRASIA. See EYEBRIGHT.

EUPHRATES (in the oriental languages, *Frat*, *Phrat*, or *Forat*) is the largest river in western Asia, and, with the Tigris, forms the most important river-system of that quarter of the world. It has its source in the heart of Armenia in two branches—the Kara Su and the Murad, of which the former rises 25 m. n.e. of the town of Erzerum, and flows s.w. to a point 10 m. n. of Keban' Ma'den, where it is met by the Murad, which rises on the southern slope of Alá Tagh, and flows w.s.w. to the point of confluence. From Keban' Ma'den, the E. flows in a general southern direction, with a tendency, however, to struggle westward towards the Mediterranean. In this part of its course, it breaks through the Taurus, and flows among the mountains for 45 m., emerging at Sumeisat, whence it continues navigable to the sea—a distance of 1195 m.—and passing Bir, at which point it is 628 ft. above the level of the Mediterranean, and 100 m. distant from its nearest shore. After passing Samosta, it changes its direction, and flowing s., separates for a considerable distance Mesopotamia from Syria and the deserts of Syrian Arabia. Curving to the s.e., it flows on without receiving almost any tributaries for about 700 m., until it is joined at Kurnah or Kornah by the waters of the Tigris. From Kurnah, the river, taking the name of the Shatt-el-Arab, continues to flow in a s.e. direction, until, after being united by a canal with the Karun from the mountains of Persia, it empties itself, by several arms, into the Persian gulf, 90 m. below Kurnah. The total length of the E. is 1600 m.; the area drained by all the waters which enter it is estimated at 260,000 square miles; and the volume of water discharged by it is 401,010 cubic ft. per second, or 72,910 cubic ft. more than that discharged by the Danube in the same time. The average width of the Shatt-el-Arab is upwards of 600 ft.; it is navigable in mid-stream for vessels of 500 tons. The water of the E., although muddy, is not unwholesome. Its inundations, caused by the melting of the snows, take place chiefly from the beginning of Mar. till the end of May; and in ancient times, when canals and embankments regulated these inundations, exercised the same beneficial effect on the country as those of the Nile on Egypt. See Peters, *Nippur or Explorations and Adventures on the Euphrates* (1897); also the article BABYLON.

EUPHROSINE (i.e., the joyous one), one of the Graces (q.v.).

EUPHUISM (Gr. *euphuos*, of vigorous growth; eloquent), a term used in English literature to denote an affected and bombastic style of language, fashionable for a short period at the court of Queen Elizabeth. The word was formed from the title of the book which brought the style into vogue, the *Euphuos* of John Lyly (q.v.).

EUPIONE (Gr. *eu*, good, and *pion*, oil) is an extremely mobile oil, obtained from the lighter portions of the liquid products of the destructive distillation of wood (wood-tar), coal (coal-tar), and animal matter, and in the distillation of rape-seed oil. It may be obtained in a sufficient state of purity by acting upon the crude tars and oils by concentrated sulphuric acid, or a mixture of sulphuric acid and niter, which removes the majority of the other ingredients; and on the distillation of the portion which resisted the action of the acid, the first part which passes over is the eupione. When pure, it has the composition C_8H_8 , and is therefore a hydro-carbon. It is the lightest liquid known, having the density of 655 (water = 1000), and is thin, colorless, and tasteless, while it possesses a pleasant aromatic odor. It boils at 116° F., and distills readily;

whilst, when set fire to, it is very inflammable, burning with a white flame of considerable luminosity and penetrating power. It makes a greasy stain on paper, is insoluble in water, very slightly soluble in alcohol, but readily miscible with ethers and oils in general.

EUPODA, a family of coleopterous insects of the tetramerous section of the order, deriving their name (Gr. well-footed) from the great size of the hinder thighs of many of the species. They feed on the stems and leaves of plants, some of them on aquatic plants, the roots of which afford food to their larvæ. The body is oblong; the antennæ filiform. Some of the E. are among the most splendid of tropical insects. Britain produces a number of small species.

EUPOLIS, b. 445 B.C.; an Athenian poet of the old comedy, ranking, in the opinion of Horace, with Cratinus and Aristophanes. It is said that he was thrown into the sea by Alcibiades, who had suffered from his sarcasm; but, according to another account, he fell in either the battle at Cynossema, 411 B.C., or that of Ægospotami, 408 B.C. He was sufficiently great to have a quarrel with Aristophanes on mutual charges of plagiarism.

EURA'SIAN, from Eur (Europe) and Asia; a half-breed, offspring of an Asiatic mother and European or American father. This class is very numerous in the large cities of India, and at the ports open to foreign commerce in Burmah, Siam, China, and Japan. In person they are usually handsome, well-formed, and, as a rule, learn the language of their fathers; but are not well esteemed by either natives or foreigners. By the laws of Japan and of Great Britain, the sons are citizens with their fathers, the daughters with their mothers.

EURE, a river of the n.w. of France, and a tributary of the Seine, rises in the department of Orne, flows first s.e. into the center of the department of Eure-et-Loir, then n. and n.w. through the departments of Eure-et-Loir and Eure, and joins the Seine on the left above Pont-de-l'Arche, after a course of about 100 miles. Only that portion of the E. which is in the department of Eure is navigable.

EURE, a department in the n.w. of France, immediately s. of the department of Seine Inférieure, contains an area of 2,300 sq. miles. Pop. 340,652. Its surface is unusually level, as the highest eminences in the department are not more than 300 ft. in height. The principal river is the Seine, which, entering the department from the s.e., flows through it in a n.w. direction to Pont-de-l'Arche, below which the course of this river is in the department of Seine Inférieure. The Eure, from which this department derives its name, and the Rille, both affluents to the Seine, are the only other important rivers. The chief natural products are grain (especially wheat and oats), hemp, flax, vegetables, and fruit, particularly apples and pears, from which large quantities of cider and perry are made. The breeding of cattle, horses, and sheep, is favored by extensive meadow and pasture-lands. There are extensive iron and copper works and pin manufactories. Cotton goods, cloth, linen, paper, glass, and stoneware are likewise manufactured. The department of Eure is divided into five arrondissements—Évreux, Louviers, Les Andelys, Bernay, and Pont-Audemer. The capital is Évreux (q. v.).

EURE-ET-LOIR, a department of France, formed chiefly from the province of Orléanais, extends between lat. 47° 57' and 48° 55' n., and long. 0° 47' and 2° east. Area, 2,263 sq. miles. Pop. '96, 280,469. It is watered mainly by the Eure in the n., and the Loir in the s., the two rivers from which it takes its name. This department lies on the watershed between the bay of Biscay and the English channel. It is in general level, the e. and s. being occupied by high and extensive flats; while in the w. the scenery is finely varied by hill and valley. The soil is fertile.

EUREKA (Gr.). "I have found it." An exclamation attributed to Archimedes, the famous philosopher of Syracuse. Hiero the king sent a quantity of gold to a jeweler to be made into a crown. He suspected that the man had taken some of the gold and supplied its place with alloy. Therefore he asked Archimedes to test the work and determine the truth. The philosopher was just then stepping into his bath, and as he did so the water overflowed. The fact struck his mind that the water was displaced in ratio with the bulk of the object immersed, and suggested to his mind that, as a pound of gold was much smaller than a pound of silver, the trial of the crown in water would be a sure test. Convinced of the fact, he jumped from the bath, shouting "Heureka! Heureka!" and, without waiting to dress, ran home to prove the truth of his discovery.

EUREKA, a co. in e. Nevada, formed 1873. Area, 4150 sq. m.; pop. '91, 3275. Co. seat, Eureka.

EUREKA, city and co. seat of Humboldt co., Cal.; on Humboldt bay and the Eel river and Eureka railroad; 225 miles n. of San Francisco. It has an excellent harbor, which has been improved by the U. S. government on the jetty plan; is supplied with gas and electric lights, streets paved with bitumen, sidewalks of concrete and redwood planks, and waterworks; and is principally engaged in the shipment of redwood lumber and dairy products. Sequoia park is a tract of 20 acres of virgin redwood forest near the city, kept unimproved excepting by drives and trails. Pop. '90, 4,858.

EUREKA, a town and co. seat of Eureka co., Nev., in the Diamond mountains; 65 m. e. of Austin. It is the centre of a cluster of very rich mines of silver and lead; is almost wholly engaged in mining, smelting, and refining silver; has several churches, a bank,

and a weekly newspaper; and is connected with Palisade station, on the Central Pacific railroad, by the Eureka and Palisade railroad. Pop. '90, 1609.

EURIPIDES, the latest of the three great Greek tragedians, was b. at Salamis, 480 B.C., on the very day (23d Sept.), it is said, of the glorious victory gained by the Greeks over the Persians near that island. The Arundel Marble, however, gives as the date of his birth 485 B.C., while Müller, following Eratosthenes, makes it four years later. His education was very good. At first, he was trained to gymnastic exercises (in consequence of the prediction of an oracle that he should be crowned with "sacred garlands"); he next turned his attention to painting; then studied philosophy under Anaxagoras, and rhetoric under Prodicus, and formed a lasting friendship with Socrates. The first play of E.'s which was performed was the *Peliades* (456 B.C.). In 441 B.C., he gained the first prize for tragedy, and continued to write for the Athenian stage until 408 B.C., when he accepted an invitation to the court of Archelaus, king of Macedonia. Scandal has invented other reasons for E.'s leaving Athens, but they are unworthy of notice. He is said to have been killed (406 B.C.) by dogs, which were set upon him by two brother-poets who envied him his reputation. In E.'s time, Greek tragedy had been brought to its highest perfection by Sophocles, who was 15 years older than Euripides. The latter, however, was the second favorite author of his time; nay, on more than one occasion, his tragedies were preferred to those of Sophocles; but his liberal and even neologistic tendencies in regard to religion, excited the hostility of that witty but scurrilous champion of Greek orthodoxy, Aristophanes, who frequently ridiculed E. in cutting parodies. There can be no doubt that E. was systematically abused by the Athenian tory party, of whom Aristophanes was the literary chief, and to whose unscrupulous opposition it was owing that he gained the prize only five times out of 75 competitions. But against the censure of Aristophanes may be set the praise of two much greater men—Aristotle and John Milton. E.'s plays are reckoned by some to have amounted to 75, by others to 92. Only 18 have come down to us. These are *Alceste* (438 B.C.), *Medea* (431 B.C.), *Hippolytus* (428 B.C.), *Heccuba* (424 B.C.), *Heracleida* (421 B.C. ?), *Supplices* (421 B.C. ?), *Ion* (date not ascertainable), *Hercules Furens* (date not ascertainable), *Andromache* (420–17 B.C.), *Troades* (415 B.C.), *Electra* (415–13 B.C.), *Helena* (412 B.C.), *Iphigenia in Tauris* (date uncertain), *Orestes* (408 B.C.), *Phænissa* (probably same year), *Bacchæ* (probably written in Macedonia), *Iphigenia in Aulis* (posthumously represented in Athens); and finally, *Cyclops* (uncertain). *Rhesus*, attributed to E., is probably not genuine. Concerning E. and his tragedies, A. W. Schlegel remarks: "Of few authors can so much good and evil be predicated with equal truth. He was a man of infinite talent, skilled in the most varied intellectual arts; but although abounding in brilliant and amiable qualities, he wanted the sublime earnestness and artistic skill which we admire in Æschylus and Sophocles. He aspires only to please, no matter by what means. For this reason, he is so frequently unequal to himself; producing at times passages of exquisite beauty, and frequently sinking into positive vulgarity." The main object of E. was to excite emotion, and his works laid open a totally new world (in literature), that of the heart, which, beyond dispute, contributed much to their popularity. On the other hand, his inartistic and careless plots compelling him to a constant use of the *deus ex machina* solution of difficulties, and occasionally even the subjects of his art themselves, leave ample room for criticism. Archelaus refused to allow his bones to be removed to Athens, and erected a splendid monument to him in Pella, with the inscription: "Never, O Euripides, will thy memory be forgotten!" Still more honorable was the inscription on the cenotaph erected to him by the Athenians on the way to the Piræus: "All Greece is the monument of Euripides; Macedonian earth covers but his bones." Sophocles, who survived him, publicly lamented his loss; and the orator Lycurgus afterwards erected a statue to him in the theater at Athens. The *editio princeps* of E. appeared, it is thought, at Florence, toward the end of the 15th century. The best modern editions are those of Beck (Leip. 1778–88), Matthiæ (Leip. 1813–29), Kirchhoff (1867), and Nauck (1885). In 1892, Mr. Flinders Petrie discovered in Egypt papyri containing part of a lost play of Euripides, the *Antiope*. See Verrall, *Euripides the Rationalist* (1895).

EURIPUS, the channel between the island of Eubœa and the coast of Greece. Opposite Chalcis it is but a little over 60 yards wide and 7 or 8 ft. deep. There is a rock in the channel, on which stands a castle connected with both shores by bridges. This double bridge is said to have been built originally as early as the 4th c. B.C.

EUROCLYDON, the name given to a wind which caught the ship in which Paul undertook his voyage to Rome. Biblical scholars are not entirely agreed as to the term and its meaning; but it is evident that it was a n.e. wind, or e.n.e., with variable and fierce gusts from various points—similar to our *northeasters*. It was probably one of those violent gales now called *levanters*. See ETESIAN WINDS.

EUROPA, in Greek mythology, a daughter of Agenor or of Phœnix. Her beauty attracted the attention of Zeus, who appeared in the form of a white bull and carried her to Crete, where she became the mother of Minos, Rhadamanthus, and Sarpëdon. Her brother Cadmus, strictly charged not to return without her, set out with their mother (Telephassa) to find her. The mother died in Thessaly. At Delphi, Cadmus

learned that he must follow a cow, which would guide him to the place where he must build a city. The cow lay down on the site of Thebes; but before he could offer the animal as a sacrifice to Athene he had to fight with a dragon which haunted a well. He conquered the dragon, and sowed its teeth over the ground. From the teeth sprang armed men who slew each other until only five were left to become the progenitors of the Thebans. Athene made Cadmus king of Thebes, and Zeus gave him Harmonia as his bride. The fate of Europa is not further recorded, but her name still lives in the designation of the continent of Europe.

EUROPE, the smallest, but also the most highly civilized and most populous of the three great divisions of the old continent. It is separated from America on the w. and n.w. by the Atlantic; from Africa on the s. by the Mediterranean; and from Asia by the archipelago, Sea of Marmora, Black Sea, Caucasian ridge, Caspian Sea, Ural River and mountains, and the Kara River. It is in the form of a huge peninsula, projecting from the n.w. of Asia. Its extent from Cape St. Vincent on the s.w. to the mouth of the Kara River on the n.e. is 3,400 m.; and from Cape Nordkyn, the most northerly point of the Scandinavian mainland, to Cape Matapan, the southmost point of Greece, 2,400 miles. The continent of E., irrespective of islands, lies within lat. $36^{\circ} 1'$ to $71^{\circ} 6'$ n., and long. $9^{\circ} 30'$ w. to $68^{\circ} 30'$ east. Its area is estimated at more than 3,800,000 sq. m.; and its coast-line, more extensive in proportion to its size than that of any other great natural division of the globe, is estimated at 31,000 m. This is caused by its great irregularity, and its deep gulfs and inlets. It has a pop. of 328,000,000, which gives an average of about 86 for every sq. mile.

The body of the European continent divides itself naturally into two great portions—the great plain in the n.e., and the highlands in the s.w., the mountainous peninsula of Scandinavia, lying, as it were, apart from either, being to some extent exceptional. The plain occupies about two thirds (2,500,000 sq.m.) of the entire extent of the continent. It reaches from the eastern boundary of E., n. to the shores of the Arctic ocean, s. to Mount Caucasus and the Black Sea, and westward over the whole extent of the continent; gradually, however, becoming narrower in its progress west. In shape, this plain resembles a triangle; its base rests on the eastern boundary, and it may be said to reach its apex on the shores of Holland. It separates the two mountain systems of E.—the Scandinavian system (see SCANDINAVIA) on the n., and on the s. the system of southern Europe. See ALPS, APENNINES, BALKAN, CARPATHIAN MOUNTAINS, CEVENNES, PYRENEES, etc.

Jutting out in numerous peninsulas, and indented by extensive bays and gulfs, E. has no town at a much greater distance from the sea than 400 m., save those in the center of the eastern plain; but even here, by means of numberless rivers and the canals, which, from the nature of the country, are easily constructed and maintained, a splendid system of communication by water now exists. See VOLGA, DÜNA, DNEIFER, NIEMEN, etc. Also RUSSIA.

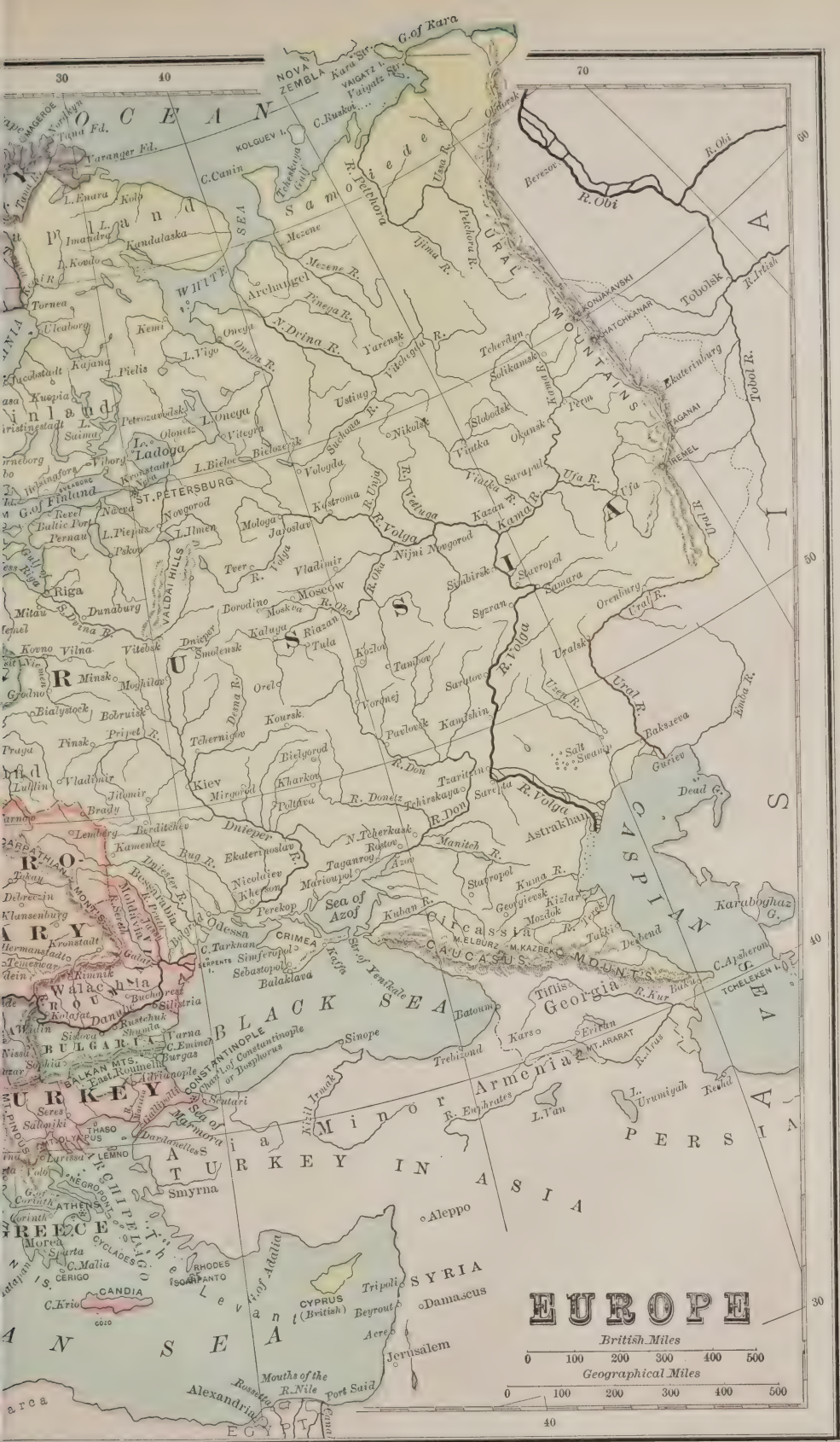
As the details of the geography of E. are given under the names of its several political divisions, and of its lakes, rivers, etc., little falls to be said under the present head. On the opposite page, however, is a table of the countries of E., with their extent, etc.

Geology.—The geology of E. is most conveniently considered under the different countries. See also ALPS, PYRENEES, etc.

Natural History.—The natural history of E. very much agrees with that of the corresponding latitudes of Asia. The natural history of the European countries on the Mediterranean sea is very similar to that of Syria and of Asia Minor. The natural history of the more northern regions of E. resembles that of the great plains of Central Asia and Siberia. The most northern regions have the strictly arctic flora and fauna common in a great measure to all the arctic and subarctic regions; whilst the natural history of the most southern countries assumes a subtropical character. The European countries near the Mediterranean produce fewer of the shrubby and odoriferous *labiateæ* than the Caucasus and adjoining regions, whilst the *caryophyllaceæ* are more abundant. The extreme abundance of *cistaceæ* is a peculiar feature of the flora of Spain and Portugal. The *primulaceæ* are particularly plentiful in all the alpine regions of the s. of E., but this characteristic is in some measure shared by the Himalaya. In no other part of the world do the umbelliferous and cruciferous plants form so large a proportion of the flora as in Europe.

The temperature of the western and northern parts of E. being raised by the gulf-stream and the winds from the great mass of dry and desert land in Africa above what is elsewhere found in similar latitudes, the flora and fauna exhibit a corresponding character, affected, however, by the great amount of moisture derived from the Atlantic ocean; and also to a still greater degree by the comparative uniformity of temperature which the proximity of the ocean produces. The effect of the last-mentioned causes is so great, that the northern limit of some plants is sooner reached on the shores of the Atlantic than in the more central parts of E., where the winters are much colder, and the average temperature of the year is lower. Of this the vine and maize are notable examples. Plants which require a mild winter will not grow in the n.—and scarcely even in the center of E.—but they advance along the western coast under the influence of the maritime climate. Thus the myrtle—although not indigenous—grows even in the





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s. of England. Amongst plants, the date palm, and amongst animals a species of **ape**, are found in the s. of E. (the ape only on the rock of Gibraltar); whilst some strictly African birds are frequent visitants, and many birds—as the cuckoo, swallow, etc.—are common to E. and Africa, inhabitants in summer even of very northern regions, and returning in winter to the warm south.

| STATES.* | Form of Government. | Ext. in Eng. Sq. M. | Population. | No. In- hab. per. E. Sq. M. |
|---------------------------------------|---|---------------------------|-------------|--------------------------------------|
| Andorra..... | Republic, with a sovereign council..... | 175 | 6,000 | 34 |
| Austria-Hungarian Monarchy..... | Limited monarchy, two chambers..... | 240,942 | 41,358,886 | 171 |
| Belgium..... | Limited monarchy, two chambers..... | 11,373 | 6,410,783 | 563.7 |
| Bosnia, Herzegovina, etc..... | Occupied by Austria..... | 23,262 | 1,568,092 | 67.4 |
| Britain, Great, and Ireland..... | Limited monarchy, two houses of parliament..... | 120,979 | 38,104,975 | 314.9 |
| Bulgaria and Eastern Roumelia..... | Principality and autonomous province (under Turkey)..... | 37,860 | 4,302,202 | 113.7 |
| Denmark..... | Limited monarchy, two chambers..... | 15,289 | 2,185,335 | 143 |
| France..... | Republic, two chambers..... | 204,092 | 38,517,975 | 188.7 |
| German Empire..... | Limited monarchy, two chambers..... | 208,670 | 52,279,901 | 250.5 |
| Prussia..... | Limited monarchy, two chambers..... | 134,537 | 31,855,123 | 236.7 |
| Alsace-Lorraine..... | Crownland (Reichsland)..... | 5,601 | 1,640,986 | 293 |
| Anhalt..... | Duchy, limited sovereignty, one chamber..... | 906 | 293,298 | 323.7 |
| Baden..... | Grand duchy, limited sovereignty, two chambers..... | 5,822 | 1,725,464 | 290.3 |
| Bavaria..... | Limited monarchy, two chambers..... | 29,282 | 5,818,544 | 198.7 |
| Bremen..... | Free city, senate and burgher assembly..... | 100 | 196,404 | 1,964 |
| Brunswick..... | Duchy, limited sovereignty, one chamber..... | 1,424 | 434,213 | 304.9 |
| Hamburg..... | Free city, senate and burgher assembly..... | 158 | 681,632 | 4,314.1 |
| Hesse..... | Grand duchy, limited sovereignty, two chambers..... | 2,966 | 1,039,020 | 350.3 |
| Lippe..... | Principality, limited sovereignty, one chamber..... | 469 | 134,854 | 287.5 |
| Lübeck..... | Free city, senate and burgher assembly..... | 115 | 83,324 | 724.5 |
| Mecklenburg-Schwerin..... | Grand duchy, limited sovereignty, one chamber..... | 5,135 | 596,857 | 116.2 |
| Mecklenburg-Strelitz..... | Grand duchy, limited sovereignty, one chamber..... | 1,131 | 101,540 | 89.7 |
| Oldenburg..... | Grand duchy, limited sovereignty, one chamber..... | 2,479† | 373,739† | 150.7 |
| Reuss-Greiz..... | Principality, limited sovereignty, one chamber..... | 122 | 67,468 | 552.8 |
| Reuss-Schleiz..... | Principality, limited sovereignty, one chamber..... | 319 | 132,130 | 414 |
| Saxe-Altenburg..... | Duchy, limited sovereignty, one chamber..... | 511 | 180,313 | 352.8 |
| Saxe-Coburg-Gotha..... | Duchy, limited sovereignty, one chamber for each duchy..... | 755 | 216,603 | 279.5 |
| Saxe-Meiningen..... | Duchy, limited sovereignty, one chamber..... | 953 | 234,005 | 245.5 |
| Saxe-Weimar..... | Grand duchy, limited sovereignty, one chamber..... | 1,388 | 339,217 | 244.3 |
| Saxony..... | Limited monarchy, two chambers..... | 5,787 | 3,787,688 | 654.5 |
| Schaumburg-Lippe..... | Principality, limited sovereignty, one chamber..... | 131 | 41,224 | 314.6 |
| Schwarzburg-Rudolstadt..... | Principality, limited sovereignty, one chamber..... | 363 | 88,685 | 244.3 |
| Schwarzburg-Sondershausen..... | Principality, limited sovereignty, one chamber..... | 333 | 78,074 | 234.5 |
| Waldeck..... | Principality, limited sovereignty, one chamber..... | 433 | 57,786 | 133.4 |
| Württemberg..... | Limited monarchy, two chambers..... | 7,533 | 2,081,151 | 276.5 |
| Greece..... | Limited monarchy, one chamber..... | 25,041 | 2,187,208 | 87 |
| Italy..... | Limited monarchy, two chambers..... | 110,623 | 31,102,833 | 281.2 |
| Liechtenstein..... | Principality, one chamber..... | 63 | 9,593 | 152.2 |
| Monaco..... | Principality..... | 8 | 13,304 | 1,663 |
| Montenegro..... | Principality, limited sovereignty..... | 3,630 | 200,000 | 55 |
| Netherlands, including Luxemburg..... | Limited monarchy, two chambers..... | 13,646 | 5,077,034 | 372 |
| Portugal..... | Limited monarchy, two chambers..... | 34,038 | 5,082,247 | 149.3 |
| Roumania (kingdom)..... | Two chambers..... | 48,307 | 5,800,000 | 120 |
| Russia (in Europe)..... | Absolute monarchy..... | 2,095,504 | 103,703,213 | 47 |
| San Marino..... | Republic, sovereign council..... | 32 | 8,200 | 256.2 |
| Servia..... | Kingdom, two chambers..... | 19,050 | 2,288,259 | 120.1 |
| Spain..... | Limited monarchy, two chambers..... | 197,670 | 17,565,632 | 88 |
| Sweden and Norway..... | Limited monarchy, two chambers for each country..... | 297,321 | 6,920,177 | 44.5 |
| Switzerland..... | Republican confederation, federal diet..... | 15,976 | 2,986,848 | 186.9 |
| Turkey (in Europe)..... | Absolute sovereignty..... | 61,200 | 4,780,000 | 78.1 |

Of the plants now most commonly associated in our thoughts with the southern countries of E., many have probably been introduced from Africa, or from the east. This has probably been the case even with the myrtle, and certainly has been the case with the vine, the olive, the orange, lemon, etc., the fig, the peach, the almond, the apricot, etc. Some of the most extensively cultivated fruits are certainly indigenous to E., as the apple, pear, plum, and cherry, although even of these the first improved varieties may have been introduced from the earlier seats of civilization in the east. Among the wild animals of E. at the present day, the aurochs or bison is still reckoned; and the ox existed at no very remote period in a truly wild state. The reindeer

* These statistics are given according to actual censuses taken between 1879 and 1891.

† Including the principalities of Lübeck and Birkenfeld.

inhabits the extreme n. of E.: the elk, the stag, the fallow-deer, and the roebuck, are found in more southern nations; the ibex or bouquetin exists on the high central mountains; two species of antelope—the chamois of the Alps, and the saiga of the Russian plains—connect the European fauna with the Asiatic and African. Of carnivorous animals, the most worthy of notice are the bear, the wolf, the fox, and the lynx.

The abundance of lakes and streams in the northern parts of E. is accompanied with a corresponding abundance of water-fowl (*anatidæ*) and of fish. Of the latter, the *salmonidæ* are the most valuable, and the *cyprinidæ* next to them. The European seas afford valuable fisheries, particularly of herring and of cod in the n., and of tunny, anchovy, etc., in the Mediterranean.

The common hive bee and the Ligurian bee may probably be regarded as natives of Europe. The silk-worm was introduced from the east. Another valuable insect, the cochineal insect, was introduced from America; but the *cantharis*, or blistering fly, is truly indigenous to the s. of Europe.

EUROTAS, a river of Greece now called the Vasiliko, rising in the Arcadian mountains and falling into the gulf of Laconia. The cities of Sparta and Amyclæ were on this river, which was one of the streams to which the ancient Greeks paid divine honors.

EURYALE, a genus of plants of the natural order *nymphæaceæ*, or water-lilies, closely allied to *Victoria* (q.v.), although of very different appearance. *E. ferox* is a water-lily with small red or violet-colored flowers, leaves about a foot in diameter, the leaf-stalks and calyces covered with stiff prickles; a native of India and China. The fruit is round, soft, pulpy, and of the size of a small orange, composed of a number of carpels, and containing round black seeds as large as peas, which are full of a nutritious agreeable farina, and are eaten roasted. The root-stock also contains starch, which may be separated and used for food; and the root itself is eaten. The plant is said to have been in cultivation in China for upwards of 3,000 years.

EURYDICE, the wife of Orpheus. She died from the sting of a serpent, and her husband followed her into hades, where he so charmed Pluto with the music of his lyre that he was permitted to take Eurydice back to earth on condition that while on his way he would not look behind him. Just as they were near the entrance Orpheus could no longer refrain from casting a backward glance, which showed him Eurydice rapidly receding to the regions of the dead.

EUSEBIUS, of Cæsarea, the father of ecclesiastical history, was b. in Palestine, about 264 A.D. He took the surname of Pamphili from his friend Pamphilus, bishop of Cæsarea, whom he faithfully attended for the two years (307-309) in which he suffered imprisonment during the persecution of Diocletian. He then went to Tyre, and afterwards to Egypt, where he himself was thrown into prison on account of his religion. In 315, he succeeded Agapius as bishop of Cæsarea, took a prominent part at the council of Nice in 327, and died about 340.—E. was the head of the semi-Arian or moderate party in the council of Nice. That party were averse to discussing the nature of the Trinity, and would have preferred the simplicity of Scripture language in speaking about the Godhead to the metaphysical distinctions of either side. They regarded Trinitarianism, on the one hand, as logically indefensible, but, on the other, they recognized the fact, that Scripture sometimes spoke of the Son in terms not compatible with the views of Arius, and therefore they wished each man to enjoy the utmost freedom in his interpretation of Scripture on this point. E. thought that the great thing was to lay to heart the truth, that "God so loved the world that he gave his only begotten Son, that whosoever believeth on him should not perish, but have everlasting life." The promise is to him that *believeth on him*, not, he argues, to him that *knows how he is generated from the Father*. He was very reluctant to accept the term *homoousios* (of the same substance), devised by Athanasius to describe the equality of the Son with the Father, and retained the kindest feelings towards Arius after the views of the latter were condemned. His moderation and other excellent qualities procured him the favor of Constantine, who declared that he was fit to be the bishop of almost the whole world. E. has the reputation of being the most learned Father of the church after Origen. His chief works are—1. The *Chronicon*, a history of the world down to the celebration of Constantine's *Vicennalia* at Nicomedeia and Rome, 327 and 328 A.D. It is valuable as containing extracts from such writers as Berosus, Sanchoniathon, Polyhistor, Cephalion, and Manetho. It was first published in a complete state by Mai and Zohrab, at Milan, in 1818, from an Armenian MS. version discovered at Constantinople. 2. The *Preparatio Evangelica*, in 15 books, a collection of such statements in old heathen authors as were fitted to make the mind regard the evidences of Christianity in a favorable light. It was translated into Latin, and appeared at Treviso in 1480. The Greek text was first published at Paris in 1544. 3. *Demonstratio Evangelica*, in 20 books, a work intended to convince the Jews of the truth of Christianity from the evidence of their own Scriptures. A Latin version of this was printed as early as 1498; the Greek original did not appear till 1544, when it was published along with the *Preparatio* at Paris, by R. Stephens. 4. The *Ecclesiastical History*, in 10 books. This relates the principal occurrences which took place in the Christian church till the year 324,

and contains the results of his studies in numerous libraries, and even in the imperial archives, the emperor Constantine having ordered, at E. 's request, an examination of all documents relative to the history of martyrs. One drawback of the work is that E., on principle, withholds all account of the wickedness and dissensions of Christians, inasmuch as he did not consider such stories for the edification of the church. A Latin translation of the work by Rufinus was published at Rome in 1474; the Greek text at Paris in 1549, and at Geneva in 1612. Among the more recent editions are those of Heinichen (Leib. 1827) and Burton (Oxford, 1838). The *Ecclesiastical History* has been translated into English, German, French, etc. Besides the foregoing works may be mentioned the *De Martyribus Palestinæ*, a book against Hierocles; another against Marcellus; and a *Life of Constantine*. The first edition of all E.'s works appeared at Basel in 1542. See the life of Eusebius by Hély (1877).

EUSEBIUS, of Emesa, was b. at Edessa, studied at Alexandria, and was the pupil of Eusebius Pamphili, and the friend of Eusebius of Nicomedeia. Averse to all theological controversies, he declined the bishopric of Alexandria, vacant by the deposition of Athanasius. He was afterwards, however, appointed bishop of Emisa, but during his ordination, a Christian mob, accusing him of "mathematics" and magic, created a tumult, and obliged him to flee for his life. Subsequently, he returned to Emisa, where he was "tolerated" in spite of his dangerous knowledge. He died at Antioch in 360. The emperor Constantius was much attached to E., and used to take him with him on his military expeditions. E. was accused of Sabellianism (see SABELLIUS), and Jerome calls him "the ringleader of the Arian party." Jerome, however, was rash in his epithets, and it is more probable that he belonged to the party of his namesake of Cæsarea, the semi-Arians, or peace-party, who wished the doctrine of the Godhead expressed in the language of Scripture, and not of theology. The homilies extant under his name have been published by Augusti (Elberf. 1829). The genuine ones display great eloquence. Other writings by him, as, for example, the *Questiones XX. Evangelicæ*, and part of the *Commentarius in Lucam*, were published by Mai, in the *Scriptorum Veterum Nova Collectio* (vol. i., Rome, 1825). See Thilo, *Ueber die Schriften des E. von Emesa* (Halle, 1832).

EUSEBIUS, of Nicomedia, Patriarch of Constantinople, b. towards the end of the 3d c., was first tutor to the emperor Julian, to whom he was related by the mother's side; then bishop of Beryta (Beyrout), in Syria, and afterwards of Nicomedia. In order to secure his position, he appeared as the defender of Arius at the council of Nice, and afterwards placed himself at the head of the Arian party. Under the emperor Constantine, whom he baptized in 337, he became patriarch of Constantinople. He died in the year 342, after having, in the previous year, held an assembly of the church for the establishment of Arianism at Antioch. It is not easy to get at his real character. We have no ecclesiastical works by Arian writers, our only sources of information as regards the character and opinions of that party being their enemies—the orthodox party; yet, making the ordinary allowance for partisanship, there would seem to be sufficient reason for concluding that E. was cunning and double-tongued when occasion required, and imperious and violent when he had power in his hands. Athanasius considered him not the disciple, but rather the teacher of Arius. From him the Arians are sometimes styled Eusebians. See Neander, *Kirchengeschichte*, vol. ii. p. 773, etc.

EUSTACHIAN TUBE. See EAR.

EUSTACHIAN VALVE. See FÆTUS.

EUSTACHIUS, BARTOLOMEO, an Italian anatomist, who was b. in the early part of the 16th c., and died in 1574. Few particulars are known regarding his life, but we learn from the introduction to one of his works, that in 1562 he was professor of medicine in the Collegio della Sapienza at Rome. His name is indelibly associated with anatomical science, through his discoveries of the tube in the auditory apparatus, and the valvular structure in the heart, which have been called after him. He was the first to give an accurate description of the thoracic duct, and was probably the first to notice and describe the stapes (one of the chain of small bones crossing the tympanic cavity of the ear), a discovery which, however, Fallopius assigns to Ingrassias. He likewise contributed materially to the diffusion of more accurate knowledge regarding the development and evolution of the teeth, and the structure of the kidney. These discoveries are recorded in his *Opuscula Anatomica*, published at Venice in 1563. He was the first anatomical writer who illustrated his works with good engravings on copper. The *Tabula Anatomica*, which he was probably unable to publish in consequence of the poverty of which he complains in the introduction to which we have already referred, did not appear until 1714, when they were edited, with explanatory remarks, by Lancisi. Their value is sufficiently evidenced by the fact, that Albinus published a new edition, with an excellent Latin commentary, in 1743, at Leyden; that Bonn published a Dutch edition in 1798 at Amsterdam; and that a German edition appeared in 1800. Lauth, in his *History of Anatomical Discovery*, remarks that if the *Tabula* had appeared in E.'s lifetime, anatomy would have attained the perfection of the 18th c. nearly 200 years earlier. E., Vesalius, and Fallopius may be regarded as the three great founders of modern anatomy.

EUSTATHIUS, the celebrated Greek commentator on Homer and the geographer Dionysius, was born at Constantinople. He was at first a monk, then a deacon and teacher of rhetoric in his native city, and, in the year 1155, was appointed archbishop of Thessalonica, where he died in 1198. E. was profoundly versed in the ancient classic authors, and a man of prodigious acquirements, as is proved by his commentaries. The number of authors whom he quotes is almost incredible, and the value of his quotations is heightened by the consideration, that most of the works from which he extracts are no longer extant. His most important work is his *Commentary on the Iliad and Odyssey of Homer*. The first edition appeared at Rome 1542-50; the last at Leip. 1825-29. The work is open to objection on the score of method, and is diffuse and digressive, but it is nevertheless a vast mine of knowledge for students of Homer. Of a similar character is E.'s *Commentary on Dionysius*, first printed by Stephens (Paris, 1547), and lastly in Bernhardy's edition of Dionysius (Leip. 1828). Of his commentary on the hymns of Pindar, only the *Proœmium* has come down to us. It was first published by Tafel in 1832.

EUSTATHIUS, SAINT, a native of Pamphylia; bishop of Beroœa, and in 325 A.D. patriarch of Antioch. He was a zealous opponent of the Arians, who contrived to have him deposed on charges of heresy and unfaithfulness to the vows of celibacy. He was banished to Thrace, where he died about 360 A.D.

EUSTATIUS, ST., one of the Dutch West India islands, lies near the n.e. bend of the great arch of the Antilles, about 12 m. to the n.w. of St. Christopher. Lat. 17° 31' n., and long. 63° 5' west. Area, 8 sq. miles. St. E. is a pyramidal rock, of volcanic formation, showing two extinct craters, and being still subject to earthquakes. Hurricanes also of intense severity occur, more particularly in Aug. and Sept. Along its entire circuit of 29 m., St. E. has only one landing-place.

EUSTIS, JAMES BIDDLE, b. New Orleans, 1834; practiced law in La.; served in the civil war as judge-advocate on the staffs of Gens. Magruder and Johnston. He was elected as a democrat to the U. S. senate, 1876 and 1884, retired in first term in 1879, and was professor of civil law in the University of Louisiana till his re-election; and was U. S. minister and first ambassador to France in 1893-7.

EUSTIS, WILLIAM, LL.D., 1753-1825; b. Mass.; a graduate of Harvard; studied medicine under Dr. Joseph Warren; served as a surgeon in the revolutionary army, and in the hospitals. He was a member of the state legislature, a member of the council; twice a member of congress; secretary of war, 1809-12; minister to Holland, 1814; governor of Massachusetts in 1824, and died while in office.

EUTAW SPRINGS, BATTLE OF, Sept. 8, 1781; between the American revolutionists under Gen. Greene, and the British under Col. Stuart. The British retreated, losing about 630 men; the American loss was 535. The scene of the battle was about 60 m. n.w. of Charleston, S. C.

EUTERPE (i.e., she who delights), one of the nine muses, was the daughter of Zeus and Mnemosyne. She was the muse of lyric poetry, and is represented in ancient works of art with a flute in her hand. See **MUSES**.

EUTHANASIA (Gk.), an easy death, or a painless method of putting to death. The use of narcotics or other means for shortening life, in disease, has never become a subject of discussion in modern civilized countries; but it is often a very practical question as to how far such means are admissible for soothing the last hours of life, when the approach of death does not of itself dull the consciousness and the sensibility to pain. It must be decided according to all the surrounding circumstances, medical and otherwise, in each individual case. As to the medical treatment, see Munk's *Euthanasia* (1887).

EUTROPIUS, a Latin historian, concerning whom we only know that he filled the office of secretary to the emperor Constantine, fought against the Persians under Julian, and was still alive in the reign of Valens. The period of his death is unknown. His *Breviarum Historiæ Romanæ*, giving a short narrative of Roman history from the foundation of the city to the time of the emperor Valens, is written in an extremely simple and pure style, and appears to have been originally intended for the use of schools. It became very popular as the taste for original investigation declined, in that dark period between the death of the old world and the birth of the new; and is either copied or followed by the early monkish annalists. An edition, with enlargements, however, was published by Paul, son of Warnefrid and Theodolinda, generally known as Paulus Diaconus. Others continued it down to the year 813. The history existed in three distinct forms at the revival of letters: there was first the genuine work of E. in ten books; second, the expanded editions of Paul; and third, a very complete, but also largely interpolated copy contained in the *Historia Miscellæa*. The editio princeps, printed at Rome in 1471, was from the impure text of Paul. The best editions in modern times are those of Tzschucke (Leip. 1796, improved 1804), and of Grosse (Halle, 1813; Leip. 1825), and Droysen (1879).

EU'TYCHES, a Byzantine ecclesiastic of the 5th c., and a zealous but unskillful representative of the dogmatic opinions of Cyril of Alexandria. In opposing the doctrines of Nestorius, he fell into the opposite extreme, and taught that after the union of the two natures in Jesus Christ, the human nature was absorbed in the divine; an opinion which spread extensively through the Alexandrian church. E. was in consequence summoned before a synod at Constantinople in the year 448, and deposed by Flavianus,

patriarch of that city; but his cause was warmly espoused by the eunuch Chrysaphius, chief minister of the emperor Theodosius II., and Dioscurus, bishop of Alexandria, who were both opposed to Flavianus. Chrysaphius induced the emperor to call a general council at Ephesus in the following year, under the presidency of Dioscurus. Measures were taken beforehand to secure a triumph over the anti-Eutyrians. Soldiers were admitted to the deliberations of the council, to overawe the party of Flavianus; while a crowd of fierce Egyptian monks, devotedly attached to whatever was popular in Alexandria, or had been countenanced by their old pupil Cyril, drowned by their fanatical outcries the voices of those who ventured to speak against Eutyries. The result was that the judgment of the previous council was reversed; Flavianus and his adherents were deposed, and the doctrine of E. affirmed to be orthodox, and in accordance with the Nicene creed. His triumph, however, lasted only two years; in 451, Eutyrianism was pronounced heresy at the council of Chalcedon, attended by 650 bishops; and in opposition to his views, it was declared that in Christ the two natures were united without confusion or conversion of substance. Nothing further is known concerning E., except that Leo wrote to the emperor Marcian to banish him from the capital. The sect of Eutyrians, however, under the name of Monophysites, continued to exist quietly for a century after his death, in the Armenian, Ethiopian, and Coptic churches, when it awoke to new life under the auspices of Jacob Baradæus, who died bishop of Edessa, 588 A.D. His followers were called Jacobites, and have perpetuated the Monophysite doctrine in the Armenian and Coptic churches to the present day. See Neander, *Kirchengeschichte*, vol. iii., p. 1079, etc.

EUXINE (Gr. *euxinos*, hospitable) is the name applied by the ancients to the Black sea (q.v.).^a Before receiving this name it was called *Aænos Pontos*, the inhospitable sea, because of the black and turbulent weather so frequently ascribed to it by the ancient poets, and the reported cannibalism of the Scythian tribes who lined its northern shores. It seems to have been called the *Euxine*, or hospitable sea, after the establishment of Greek colonies on its borders, and when its waters were thrown open to Greek commerce.

EUYUK, or **Uruk**, a Turkish village in Asia Minor, 75 m. w.s.w. of Amasia. It has but about 20 houses, but is important as containing some of the most remarkable ruins in the east. They are the remains of a large building, and consist of colossal blocks of granite containing a great variety of sculptures very little defaced. The upper portion of the wall seems to have been formed of clay, as there are no remains of overturned materials. In form the building resembles an Assyrian palace, and has been conjectured by some to have been erected by the builders of the palaces of Nineveh, adopting in this instance, as they are known to have done in others, Egyptian figures.

EVACUATION DAY. On November 25, 1783, after the treaty of peace was signed, the British troops finally evacuated the city of New York. This was called Evacuation Day, and was celebrated as a public holiday until within the last fifteen years.

EVAGORAS, King of Salamis, 410 B.C. Isocrates says he was a just and wise ruler, who promoted the welfare of his people. He cultivated the friendship of the Athenians, and after Conon's defeat at Ægospotami gave that officer a refuge. He made friends of the Persians, and assisted them and the Athenians in gaining the victory of Cnidus, 394 B.C. In 387, he was at war with the Persians, but soon made peace. He was assassinated 374 B.C.

EVA'GRIUS, b. Syria, 536 A.D. He was an advocate at Antioch, and the legal advisor of Gregory, the patriarch. The emperor Tiberius made him a quæstor, and his influence and reputation were such that on the occasion of his second marriage he was given a public festival, which, however, was interrupted by an earthquake, in which 60,000 persons are said to have perished. He was the author of a valuable *Ecclesiastical History*.

EVAN DER, a semi-mythical Grecian hero of antiquity, was, according to Roman traditions, the son of Hermes, by Carmenta or Tiburtis. About 60 years before the Trojan war, he is said to have led a Pelasgian colony from Pallantium, in Arcadia, to Italy, and to have landed on the banks of the Tiber, and near the foot of the Palatine hill. Here he built a town, naming it Pallantium, after the one in Arcadia. At a later period it was incorporated with Rome, and is affirmed to have originated the names Palatinus and Palatium. Tradition represented E. as having done much to introduce the habits of social life among his neighbors; he prescribed for them milder laws, and taught them, among other arts, those of music and writing. To him is also ascribed the introduction of the worship of the Lycean Pan, with that of Demeter, Poseidon, and other deities. Virgil represents him as being still alive when Æneas arrived in Latium after the sack of Troy. E. was worshiped both at Pallantium, in Arcadia, and at Rome.

EVANGELICAL is an adjective derived from the Gr. *euangelion*, "good news," or "the gospel," and is applied in general to anything which is marked by the spirit of the gospel of Jesus Christ. Thus, we speak of an E. sermon, of E. piety, E. views, etc., though it is but right to mention that the term "E." in such a connection is used

by a portion of the religious community to denote, not so much a spirit or sentiment resembling that of the Saviour, but certain peculiar theological opinions, which are held to constitute the only true and complete expression of Christian belief. In England and Scotland, dissenters have generally laid claim to be considered more "E." than the national churches—i.e., they conceive that they have borne, and still bear, more decided testimony than their brethren of the establishment to the truth of such doctrines as the total depravity of human nature, the imputation of Adam's sin to his posterity, the expiatory character of Christ's sufferings, justification by faith in the atoning efficacy of these sufferings, etc. In the Anglican church, however, the rise of the Puseyite or Tractarian party has brought into prominence an antagonistic party, resembling dissenters very much in their theological tenets. This party calls itself, *par excellence*, "evangelical."—In Germany, all Protestants call themselves E., in opposition to Catholics, on the ground that the reformers taught the pure gospel of the grace of God in Christ, cleansing it of all human corruptions. The modern orthodox or pietistic party in the German Protestant churches have of late made exclusive claim to the attribute E., on the ground that they alone hold to the gospel in its actual historical shape. This claim is naturally disputed by the liberal theologians.

EVANGELICAL ALLIANCE. This voluntary association of Evangelical Christians belonging to various denominations and countries, had its origin in a general and strong desire for a more practical union among Protestants in order to promote the cultivation of Christian fellowship and the extension of Christian faith. After full conference and correspondence the alliance was formed in Freemason's hall, London, Aug. 19-23, 1846, at a meeting, of about 800 persons, Episcopalians, Presbyterians, Independents, Methodists, Baptists, Lutherans, Reformed, Moravians, and others. Among these were many distinguished ministers and philanthropists from Great Britain, Germany, France, Switzerland, and the United States. The following doctrinal articles were adopted, not as a binding creed, but simply as an expression of the points of faith considered essential among those who are embraced in the alliance. 1. The divine inspiration, authority, and sufficiency of the Holy Scriptures. 2. The right and duty of private judgment in the interpretation of the Holy Scriptures. 3. The unity of the Godhead and the Trinity of the persons therein. 4. The utter depravity of human nature in consequence of the fall. 5. The incarnation of the Son of God, his work of atonement for the sins of mankind, and his mediatorial intercession and reign. 6. The justification of the sinner by faith alone. 7. The work of the Holy Spirit in conversion and sanctification. 8. The immortality of the soul, the resurrection of the body, the judgment of the world by our Lord Jesus Christ, with the eternal blessedness of the righteous and the eternal punishment of the wicked. 9. The divine institution of the Christian ministry and the obligation and perpetuity of the ordinances of baptism and the Lord's supper. The organization thus happily commenced has since been extended throughout Protestant Christendom. Branch alliances have been formed in Great Britain, Germany, France, Switzerland, Sweden, the United States, Australia, and among the missionaries in Turkey, India, Brazil, and Japan. These national branches are related to each other as members of a confederation having equal rights. The whole alliance appears in active operation only when it meets in general conferences having the character of Protestant ecumenical councils, but claiming only moral and spiritual power. These have already been held at London, 1851; Paris, 1855; Berlin, 1857; Geneva, 1861; Amsterdam, 1867; New York, 1873; Basle, 1879; Copenhagen, 1885. The most effective of these was the one at New York, when, for the first time, Christians from all parts of the earth met together in the new world to take counsel concerning the condition of Christendom, Christian union, Christian life, Christianity and unbelief, Christianity and error, Christianity and civil government, Christian philanthropy, and reform of social evils. The visible results of the E. A. may be seen, in part, in its promotion of religious liberty wherever that has been restricted or assailed. Since its organization several cases of persecution have occurred in southern Europe under the operation of penal laws against Protestants. In these cases the influence of the alliance has been successfully exerted to bring the persecution to an end. It has aided in bringing about the remarkable changes in favor of religious liberty which have taken place in Turkey within the last quarter of a century. It interceded for the Methodists and Baptists in Sweden, and that country has since abrogated its penal laws against dissenters. It sent a delegation in 1871 to the czar of Russia to plead for the Lutherans in the Baltic provinces, and since that time they have not been oppressed. It remonstrated against the persecution of Roman Catholic and other Christians in Japan, and the persecution has not been renewed. These instances are sufficient to show that the power of Christian public sentiment, as expressed by the alliance, already commands a respectful hearing everywhere, and must, ultimately, be universally obeyed.

EVANGELICAL ASSOCIATION, called sometimes, but incorrectly, the German Methodist church, is a sect of American Christians, originally of German descent, formed under the influence of the Rev. Jacob Albright, who, looking with regret on certain doctrines and habits prevalent among the German churches of eastern Pennsylvania, endeavored to reform them. A meeting of his converts in 1800 chose him as their pastor or bishop, and gave him jurisdiction as such over the members of the association. Subsequently annual conferences were established, and in 1816 a general conference,

consisting of all the elders, met in Union county, Penn. Since 1843, general conferences, consisting of delegates from the annual conferences, have been held every four years. During its earlier years the E. A. was violently opposed, but for the last half century it has been quiet and prosperous. As it denounced slavery it made no progress in the southern states, but it has spread over the n., into Canada and even Germany. In theological doctrine it is described as endeavoring to blend Calvinistic and Arminian views; in polity, worship, and plans of work it resembles the Methodist Episcopal church; the ministers are divided into elders and deacons; the bishops (elected by the general conference) and the presiding elders (elected by the annual conference) continue in office four years, and may be re-elected. At first, preaching and other public services were conducted almost exclusively in the German language; now, however, the English also is employed. The denomination has a flourishing college at Naperville, Ill. In 1889, it reported 26 annual conferences, 1845 preachers (itinerant and local), 1808 houses of worship, 501 parsonages, 145,703 church-members, 2189 Sunday-schools. The Evangelical Association and the united Evangelical churches reported, in 1894-5, a membership of 147,849, with 2945 houses of worship.

EVANGELICAL CHURCH CONFERENCE, is the name given to periodical meetings of the Protestant churches of the German states, the holding of which was suggested by king William of Württemberg in 1815. The first was held at Berlin in 1846, and included representatives from nearly all the German states. At the second, held at Eisenach in 1852, a central organ was established at Stuttgart. From 1855 to 1868, the conferences were held at Eisenach.

EVANGELICAL COUNSELS are given by the Roman Catholic church when it recommends certain things to any one who is willing to practice them, not as in themselves obligatory, but as conducive to the attainment of superior holiness. Among them the principal are celibacy, poverty, and submission to monastic rules. Some writers include under this title various Scripture directions, such as "Resist not evil;" "If any man will sue thee at the law and take away thy coat, let him have thy cloak also;" "Whosoever shall compel thee to go a mile, go with him twain."

EVANGELICAL UNION, the name assumed by a religious body constituted in Scotland in 1843 by the Rev. James Morison of Kilmarnock (later Dr. Morison of Glasgow), and other three ministers (with their respective adherents), who had been separated from the United Secession church for doctrinal views, of which the fundamental and determining article was the strict universality of the Saviour's atonement. Coeval with the body is its theological academy, presided over by Dr. Morison, and attended by over twenty students annually. They were soon joined by a number of ministers and churches of the Congregational union of Scotland, and have since extended themselves considerably in Scotland and the n. of England. Their church government is independent, but many congregations have ruling elders. Their doctrinal views are exhibited in an authorized publication, entitled *Doctrinal Declaration*, issued in Sept., 1858. See **MORISONIANISM**.

EVANGELIST, literally, a bringer of good tidings. It designates, in the New Testament, a person appointed by an apostle to itinerate among the heathen, and so prepare the way for resident instructors. The evangelist, therefore, had no particular flock assigned to him, and is to be distinguished both from bishops and ordinary pastors. Later in the history of the early church, the evangelist figures, according to Eusebius, as "a deliverer of the written gospels to those who were ignorant of the faith." This may possibly imply that he acted as a colporteur, by distributing copies of the gospels, or that he read them to the heathen, and so made them familiar with their contents.—The word evangelist is also used to denote the four writers of the life and gospel of Jesus Christ, these being evangelists ("bringers of good tidings") *par excellence*.

EVANGELISTS, SYMBOLS OF THE FOUR. For Matthew; a man holding a pen and scroll, looking over his left shoulder at an angel: Matthew's was the first gospel, and the angel represents the dictator of it. For Mark; a man writing, and at his side a winged lion couchant, emblematical of the resurrection which is most fully described by this evangelist. For Luke; a man with a pen looking over a scroll, and near by an ox or cow chewing the cud; the latter figure refers to the eclectic character of the third gospel. For John; a young man of delicate appearance, with an eagle in the background to denote sublimity. The more ancient symbols were: for Matthew, a man's face; for Mark, a lion; for Luke, an ox; for John, a flying eagle: all alluding to the four cherubim before the throne of God, described in the *Revelation*.

EVANS, Lieutenant-general Sir DE LACY, G.C.B., 1787-1870; b. Ireland; entered the British army in 1807, and in 1814 was present as lieutenant-colonel of infantry at the capture of Washington, the attack on Baltimore, and the operations before New Orleans. He was in parliament, 1833-41, and 1846-65, representing the "advanced liberals," but in 1835 commanded the British auxiliary legion in Spain, with distinction, and quickly rising in rank, was appointed, on the outbreak of the Crimean war, to command the second division of the army sent to the Crimea, receiving many honors for his gallant conduct during the war.

EVANS, FREDERICK WILLIAM, b. England, 1808; came to the United States in 1820; returned to England, and became interested in Owen's theories and joined the Shakers. Returning to the United States, he soon became a leader of the Shakers, residing at Mount Lebanon, N. Y. He published a number of works on the history and doctrines of the Shakers, and on religious subjects. He d. in 1893.

EVANS, HUGH DAVEY, LL.D., 1792-1868; b. Baltimore; American author. He was admitted to the Baltimore bar in 1815, and attained eminence as a constitutional lawyer. He was very prominent in the councils of the Protestant Episcopal church; from 1843-58 edited several religious newspapers; from 1852-64 was lecturer on civil and ecclesiastical law in St. James' coll., Maryland. Author of *Treatise on the Christian Doctrine of Marriage* (N. Y., 1870), etc.

EVANS, MARY ANN or MARIAN, known under the pen name of "George Eliot," was b. in Chilvers-Coton parish, Warwickshire, England, Nov. 22, 1819. Her father, who was of Welsh descent, was a land agent who had begun life as a carpenter. In 1836, her mother died, and in 1841 the family removed to the vicinity of Coventry, where she became intimate with the Brays and Hennells, families whose influence over her was decided and led her from ardent evangelical belief into skepticism. In 1846, she began her literary career by translating Strauss's *Leben Jesu*, and subsequently, Feuerbach's *Essence of Christianity*. On the death of her father, in 1849, she went abroad and on her return became associate editor of the *Westminster Review*. In 1851 she became acquainted with George Henry Lewes (q.v.), who had separated from his wife, and up to his death in 1878, the two lived together as man and wife. She began to write fiction in 1856, and during 1857 there appeared in *Blackwood's Magazine*, with the signature of George Eliot, a series of stories under the title of *Scenes of Clerical Life*, the very unusual merit of which instantly attracted attention. They seemed to proclaim with great distinctness the advent of a new novelist of fresh and original power. It was from the first sufficiently well understood that the signature was a mere *nom de plume*; and no little curiosity was excited as to the personality of the author unknown. This feeling was much deepened by the publication in 1859, by the Messrs. Blackwood, of the novel of *Adam Bede*, which attained an immense success, and at once secured for the writer almost undisputed rank with the most eminent novelists of the day. This was followed, in 1860, by *The Mill on the Floss*, which amply sustained the reputation of the writer; and in 1861 by *Silas Marner, the Weaver of Raveloe*, a tale in one volume, which, as to art, is perhaps the most perfect of any of this series of works. In 1861, the *Scenes of Clerical Life* were republished from *Blackwood's Magazine*, to meet with a renewal of the favor with which they were originally received; and in 1863, *Romola*, an elaborate historical novel of Italian life, was published by Messrs. Smith, Elder & Co., in whose *Cornhill Magazine* it had previously from month to month appeared. This work has never had quite the popularity of its predecessors, but is considered by a selecter circle of readers—and perhaps on the whole with justice—the greatest intellectual effort of the author. Meantime—though the avowal has never in any formal fashion been made—it had by degrees become positively certain that Miss E. was the "George Eliot" of these works; and by not a few competent critics a place had been frankly assigned her at the very summit of this branch of our literature. *Felix Holt, the Radical*, published in 1866 by Messrs. Blackwood, was distinctly the book of the season, and was almost everywhere received with acclamation. *Middlemarch, a Study of English Provincial Life*, began to be published in divisions by Messrs. Blackwood in 1871. It was completed in 8 divisions, the last of which was issued in 1872, and simultaneous with it the entire work appeared in 4 vols. The divisions had an enormous circulation, and enhanced Miss E.'s great reputation. *Daniel Deronda* was published in the same way in 1876. Miss Evans also published poetry of a high degree of merit. *The Spanish Gypsy* was published by Messrs. Blackwood in 1868; in 1869 appeared *Agatha, a poem*; in 1870, *The Legend of Jubal*, a poem of great power; and in 1871, *Armgarth, a dramatic poem*. In 1879 appeared a volume of essays, *The Impressions of Theophrastus Such*.

In May, 1880, she was married to John Walter Cross, a rich English merchant, 10 or more years her junior, who in 1885 published *George Eliot's Life*. She died Dec. 22, 1880. In 1883, the essays contributed by her to the *Westminster Review* were published. See *George Eliot*, by Mathilde Blind (1883); *The Ethics of George Eliot's Works*, by John Crombie Brown (London, 1879; Phila., 1885); Hulton, *The Guides of English Thought*.

EVANS, OLIVER, 1755-1819; b. Del. He was apprenticed to a wheelwright, but soon displayed uncommon inventive genius. When 22 years old he invented a machine for making card-teeth which superseded hand work. He made the first high-pressure steam-engine and the first steam dredging machine used in the United States. This was put on wheels and propelled itself to the Schuylkill river, 1½ m.; was fitted with a steam paddle-wheel and navigated the Schuylkill down to its junction with the Delaware. This is supposed to have been the first actual propulsion of a carriage on land by steam in America. He urged the construction of railroads with rails of wood or iron, but was hindered by limited means from carrying out the idea to any practical result.

EVANSTON, a township in Cook co., Ill., on lake Michigan, 12 m. n. of Chicago; on the Chicago and Northwestern railroad; includes the villages of Rogers Park and South Evanston and part of the village of Evanston. There are many churches, banks, a

free library, electric lights, and the Holly system of water-works. Evanston is the seat of Northwestern (Methodist) university, Winchell academy, and the Garrett biblical institute. It has a beautiful situation, many fine buildings, and social attractions of a high order. Pop. tp., '90, 13,059.

EVANSVILLE, city, port of entry, and co. seat of Vanderburg co., Ind.; on the Ohio river, 192 m. above Cairo; 185 below Louisville. It is reached by the Evansville and Terre Haute, Louisville, Evansville and St. Louis, Louisville and Nashville, and other roads. The city was laid out in 1817, and stands on high ground on a bend made by the river. It has a U. S. government building, court-house, U. S. marine hospital, opera house, Evans (temperance) hall, library and art gallery, a fine high-school building, several grammar and parochial schools, numerous churches, a public day school for the deaf, a commercial college, daily, weekly, and monthly periodicals, several national and other banks, and manufactories of flour, iron, malt liquors, furniture, leather, wool, cotton, etc. In 1890 there were 482 manufactories, with \$9,166,859 capital, employing 7435 persons, with products valued at \$12,809,334. The shipment of grain, tobacco, cement, whisky, wheat, pork, coal, etc., is large. Iron ore and coal abound in the vicinity. The city has gas and electric lights, electric street railroads, the Holly system of water-works, and good sewerage. Pop. '90, 50,756.

EVAPORATION, the conversion of a fluid or solid into vapor. Steam, vapors of alcohol, camphor, iodine, etc., are familiar instances. All fluids are surrounded by vapor at common temperatures; but for every substance there is a limiting temperature, below which no E. takes place. The pressure, or tension, of a vapor depends mainly upon the nature of the substance evaporated, and the temperature to which it is raised. The full amount of vapor, however, is not produced instantaneously, and therefore, in general, *time* is an element in the question as well as temperature. See **DIFFUSION**.

The boiling-point (q.v.) is the temperature at which vapor is freely given off—i.e., at which the tension of the vapor of a substance is equal to the atmospheric pressure. Dalton gave an empirical law, which, however, is only at all approximate for temperatures near the boiling-point: "The tension of the vapor of a substance rises in *geometric*, as the temperature rises in *arithmetic*, progression." It is sufficient for our present purpose to notice, that the tension increases very rapidly with the temperature. Some curious consequences result from this. Thus, water boils at 212° F., under a pressure of 30 in., or at that temperature the tension of its vapor is *one* atmosphere. At 162° F., or 50° below its boiling-point, its vapor has a tension of 10 in. of mercury, and it will therefore boil, if placed in the receiver of an air-pump, as soon as two thirds of the air have been extracted.

If a little water be boiled in an open flask till the steam has displaced a great part of the contained air, and the flask be then tightly corked, the water will gradually cool. If the flask be now dipped in *cold* water, boiling recommences, the cold water having condensed some of the vapor, and so diminished the pressure on the contained liquid. Dip the flask in *hot* water, and the boiling ceases. These appearances may be obtained several times in succession.

A fluid cannot be heated above its boiling-point, at the ordinary pressure of the atmosphere; but if it be heated in a closed vessel, the tension of the vapor produced is to be taken in addition to the former pressure, and the boiling-point rises with it. Thus, when the pressure is equivalent to 2 atmospheres, the boiling-point of water is raised 40° F. At such temperatures, its solvent powers are greatly increased. Many minerals which are found in fine crystals are supposed to have been deposited from water which had dissolved them in large quantities, under the combined influences of pressure and temperature. Papin's digester (q.v.) depends upon this principle.

The amount of E. from a fluid depends upon many circumstances. As, except in the case of actual boiling, it takes place only at the surface, the amount of surface exposed is an important consideration where rapid and copious E. is required, as in steam-boilers, salt pans, etc. When, on the contrary, it is desirable to prevent E. as much as possible, a layer of oil, preventing direct contact with the air, is of great use. The rate of E. depends also on the pressure, and varies, according to Daniell, nearly inversely as the latter. His experiments, which appear trustworthy, were made in an exhausted receiver, and the vapor was removed as it was formed.

In the conversion of a fluid into vapor, a quantity of heat disappears; i.e., is required to produce and maintain the gaseous state. Thus, the temperature of steam at 30 in. is the same (to the thermometer) as that of the boiling water from which it comes off; but the heat necessary to convert a pound of water at 212° into steam at 212°, would raise nearly 1000 pounds of water from 60° to 61°. See **HEAT**. When, therefore a fluid evaporates, the vapor carries off heat from the fluid, and thus E. produces cold. This, of course, is matter of daily observation. Porous earthenware jars are employed to cool water in summer in this climate; and in India ice is procured by exposing water in shallow pans, laid on straw, to the combined effects of E. and radiation at night.

On the same principle depends sir John Leslie's method of freezing water. The water is placed in a flat porous dish, over a large surface of strong sulphuric acid, and the whole covered with the receiver of an air-pump. When a good vacuum has been produced, there is, of course, as we have already seen, a rapid E., and the acid eagerly absorbing the vapor as it is formed, the process goes on without further working of the pump, till the residual water has become a solid cake of ice. A most extraordinary

example of this production of cold is afforded by the freezing of water on a white hot plate—by no means a difficult experiment. A platinum capsule is heated nearly to whiteness by a lamp placed underneath; a little water, mixed with sulphurous acid, which is an extremely volatile liquid (indeed it is gaseous at ordinary temperatures and pressures), is poured upon the plate. The acid instantly evaporates, and the cold produced freezes the water, which can be dropped from the hot plate on the hand as a lump of ice.

Another remarkable instance of this occurs in the formation of solid carbonic acid. The liquid acid is forced by the pressure of its own vapor in a fine stream into the air from a nozzle in the strong iron vessel in which it is contained. It evaporates so rapidly in air that a portion of the stream is frozen, and the delicate snow-like mass can be collected by proper apparatus.

Having thus briefly examined some of the circumstances connected with E., we may proceed to mention some of its important bearings on meteorology. In this respect it is one of the most effective of all the gigantic processes that are continually going on around us. Watery vapor is continually rising invisible in the air; meeting with a colder stratum of the atmosphere, or the cold ridge of a mountain, it becomes condensed into mists or clouds; the fine particles of these unite into larger groups, and fall as rain, hail or snow—to be again evaporated by heat from the moist ground, or from rivers, lakes, and seas. Even when otherwise invisible, its presence may be detected by its deposition as dew (q.v.), and, according to Clausius, in the blue of the sky, and the gorgeous tints of sunrise and sunset. There is little doubt of its being also intimately connected with the scintillation of the fixed stars. See SCINTILLATION. Atmospheric electricity is largely due to E. directly as well as indirectly, on account of the amounts of vapor contained in different currents of air. It is matter of everyday observation how much the drying of the ground, or E. generally, is promoted by a brisk wind. This finds its explanation in the constant removal of the vapor as it is formed, the diffusion of the vapor taking place into comparatively dry air instead of the moist atmosphere into which it would take place in a calm. See RAIN and ATMOSPHERIC ELECTRICITY.

EVARTS, JEREMIAH, 1781–1831; b. Vt.; graduate of Yale; admitted to the bar in 1806, and in 1810 became editor of the *Panoplist*, a religious journal in Boston. In 1812, he became treasurer of the American board of commissioners for foreign missions, and in 1821 corresponding secretary. When the *Panoplist* gave place to the *Missionary Herald*, he became editor of the latter, and by many essays and other contributions showed himself a most efficient advocate and organizer of Christian missions.

EVARTS, WILLIAM MAXWELL, LL.D., b. Boston, Feb. 6, 1818; son of Jeremiah. He graduated at Yale in 1837, and studied in the Harvard law school under Justice Story and Prof. Greenleaf; was admitted to the New York bar in 1841; deputy U. S. district attorney, 1849–53, during which period he became conspicuous in prosecuting persons engaged in filibustering expeditions to Cuba. In 1853, he was counsel for the state of New York in the Lemmon slave case. In the impeachment trial of President Johnson, he was the leading counsel for the defendant, and in 1872 he was counsel for the United States before the tribunal of arbitration at Geneva. He was president of the New York city bar association in 1880–1. Among many noted cases in which he has appeared are the Parrish will case; the will case of Mrs. Gardner, mother of the widow of President Tyler; as senior counsel for Henry Ward Beecher in the Tilton suit, and as advocate (on the republican side) before the electoral commission. He has made many public addresses, such as the eulogy on chief-justice Chase, the centennial oration at Philadelphia, at the unveiling of the statues of Webster and Seward in New York, and at the unveiling of Bartholdi's statue of Liberty. He was an early and active member of the republican party. In July, 1868, he was appointed attorney-general of the United States, and in Mar., 1877, became secretary of state, resigning in 1881, to resume the practice of his profession in New York. In 1885 he was elected to the United States senate, retiring at the expiration of his term in 1891.

EVE (Heb. *Chavvah*, i.e., the living), the name, according to the Hebrew narrative, of the wife of the first man, and so the mother of the human race. See ADAM and EVE.

EVE, PAUL FITZSIMMONS, M.D., b. Augusta, Ga., 1806; graduated at the University of Georgia, 1826; and at the medical school of the University of Pennsylvania, 1828. He studied in Europe for several years, and acted as surgeon in the Polish revolution of 1831, receiving in recognition of his services a cross of honor. He was professor of surgery in the Georgia Medical College (1832), in Louisville University (1849), in Nashville University (1850), in the Missouri Medical College (1868), and again in Nashville University in 1870. As a surgeon he was remarkable for his successful operations for stone. He died Nov. 3d, 1877.

EVECTION, a lunar inequality resulting from the combined effect of the irregularity of the motion of the perigee, and alternate increase and decrease of the eccentricity of the moon's orbit. See LUNAR THEORY.

EVELYN COLLEGE. See COLLEGIATE EDUCATION FOR WOMEN.

EVELYN, JOHN, a well-known writer of the 17th c., was b. Oct. 31, 1620, at Wotton, the seat of the Evelyn family, in Surrey. He was educated at the free school of Lewes,

and subsequently at Balliol college, Oxford. In 1640, he entered the middle temple, and in the following year, prompted by the ominous appearance of public affairs, and after having witnessed the trial of Strafford, he set out for the continent, returning, however, in the autumn of the same year. In 1642, upon offering his services to Charles I., he was accepted as a volunteer in prince Rupert's troop, but in 1643 he again went to the continent, where he mainly lived during the following eight years. After 1652, he settled in England, where he lived studiously and in private till the restoration, after which he was much employed by the government. On the organization of the royal society, he became one of the first members, and was an industrious contributor to its transactions. He succeeded, in 1699, to the family estate at Wotton, and there, after a long, studious, and highly useful life, he died 27th Feb., 1706.

His pen seems to have been constantly employed, and that upon a great variety of subjects. Art, architecture, gardening, commerce, etc., were all treated of by E., and in such a manner as to produce the most beneficial results on his own time. His principal works are *Sculptura, or the History and Art of Chalcography and Engraving on Copper*, 1662; *Silva, or a Discourse of Forest Trees, etc.*, 1664; and his *Memoirs* (first published in 1818). It is to the last of these works E. owes the celebrity he now enjoys. The *Memoirs* are written in the form of a diary, by one who had accustomed himself to habits of close observation, and continued during a period of about 70 years—and these the most dramatic in the recent history of England. They are of inestimable value. Sir Walter Scott said that "he had never seen a mine so rich." New editions were published in 1850, 1854, and 1870.

EVEMERUS, or **EUHEMERUS**, a Greek scholar of the latter part of the 4th c. A.D. He is noted chiefly for his *Sacred History*, founded professedly on archaic inscriptions which he had collected during his travels in various parts of Greece, and more especially on those observed on the temple of Jupiter Triphylanus, in the island of Panchæa. In this work, he introduced a new method of interpreting the popular myths, asserting that the gods who formed the chief objects of popular worship were mortals who, as heroes and conquerors, had earned a claim to the veneration of their subjects. Till the end of the last century, there were many who accepted this system of Evemerus, and the early Christians especially appealed to it as a confirmation of their belief that the ancient mythology was merely an aggregate of fables of human invention. Evemerus was a firm upholder of the Cyrenaic philosophy, and by many ancient writers he was regarded as an atheist, because of his dissent from the prevalent polytheism. Of his work only a few fragments remain in a Latin translation by Ennius. See **EUHEMERISM**.

EVENING PRIMROSE. See **ENOTHERA**.

EVENING SCHOOLS may be divided into two classes: 1. Those which, either in the form of lectures or lessons, carry further the education received at school; 2. Those which exist to supplement the defects of early training, or, it may be, to give the simplest rudiments of elementary instruction to adults who are under the disadvantage of being pupils for the first time in their lives. The former are found chiefly in connection with mechanics' institutes* (which are now very numerous in Great Britain, and might form one of the most important educational agencies we have), existing day schools, and congregational organizations; while the latter more frequently fall under the head of parochial missionary work, or are connected with factories. These latter constitute the class of E. S. which engage the largest share of interest in the present condition of England, and which present the greatest difficulties in working.

Considering the large proportion of the present adult population unable to read or write, the number of E. S. is miserably inadequate. But the necessity for their institution has not yet been sufficiently felt by the country, to lead to their taking a much more important place in the educational machinery of the nation than they have hitherto done. Her majesty's inspectors, the royal commissioners (1861), and the clergy of all denominations, strongly recommend their greater extension. "If the education of the country were in a good state," say the commissioners, "E. S. would be nearly universal, and would serve to compensate the scantiness of the instruction given in day schools, by giving more advanced instruction to an older class of scholars."

State Aid, and Voluntary and Paid Teachers.—Many educationists have come to the conclusion, that the hope of retaining children in school until they have obtained as much instruction as is requisite for their guidance in life is a vain one, and consequently look to E. S. as an indispensable part of a national system of education, and consider them entitled to look to the state for encouragement and support to an equal extent with day schools. Bishop Hinds was the first *publicly* to suggest that E. S. fairly come within the sphere of state action, in a letter to Mr. Senior, printed in 1839. The recent inquiries have brought out that the majority of those who frequent existing E. S. have never received any elementary instruction, or have forgotten what they once knew, and that a large proportion are either adults or adolescent young men and women. They attend for the purpose of learning to read, write, and cipher. Though in many instances, especially where no fee is charged, the irregularity and unpunctuality of the attendance are great, yet in the majority of cases there is an earnest desire on the part of the pupils

* The working-man's college in London, and the school of arts in Edinburgh, both belong to this class.

to benefit by the instruction they receive. It is a question of some national importance how far schools of this supplementary class should be left to the action of private philanthropy. It is also a question, to some extent implied in the other, whether the peculiarly delicate work required in E. S. is not more efficiently discharged by voluntary than by paid laborers.

1. As to the first question, it may be safely said, that all would desire to see those wholesome channels of benevolence which connect the poor and the rich free from government interference; but if, in our devotion to a theory, we neglect the work, it becomes the duty of the state to see to it, to the extent of encouragement at least, if not of direction. Since bishop Hinds' letter, to which we have referred above, the education committee of the privy council have recognized this duty, and have given aid to a small extent to all E. S. complying with certain conditions, and in connection with day schools. By the revised code recently issued by the privy council, E. S. of this class are allowed to claim from the parliamentary grant a considerable sum calculated on the average attendance. The schools must be taught by certificated masters, and lay persons are alone recognized. To all those schools frequented for the purpose of confirming or extending previous knowledge, the grants made under the code will be of great assistance, and enable them to secure the services of trained teachers; to those which are chiefly frequented by adults wholly ignorant of the simplest elements, and chiefly conducted by voluntary teachers, it will afford little or no advantage, because the conductors will not be able to claim so large a sum as would suffice to pay the salaries of certificated masters. Nor, perhaps, is it desirable to interfere with this particular class of E. S.; it is of more importance, so far as state aid is concerned, that the education of the primary school should be confirmed by the establishment of E. S. for *boys and girls*. There is active benevolence enough abroad to overtake the ignorance of the *adult* population, if properly stimulated by the various religious bodies.

The proposed new arrangements as to payment may also lead to the greater separation of such schools into schools for boys and girls above 13 and under 18, and schools for adults. It is found that boys and men, girls and women, do not work well together.

2. As to the second question: in those E. S. which are only a continuation of the day school, the same method will generally be found to suit as in the primary schools; and therefore it seems advisable that they should be conducted by paid certificated teachers, acting under managers (as in the case of ordinary day schools), and claiming grants from the privy council. Those schools, again, which are frequented by adults, who come to receive the elements of reading, writing, and arithmetic for the first time, require more delicate handling, and a greater consideration of individual character and wants than are requisite in a school attended by boys and girls. In such cases, voluntary effort under the influence of religious or merely philanthropic motives appears to be the best agency. The ignorance of method displayed by such teachers, and the irregular manner in which many of them hang to their work, are no doubt serious difficulties; but they may be overcome by the institution of diocesan or other unions, in imitation of the East Lancashire union of E. S. under the presidency of sir J. P. K. Shuttleworth, with each of which might be connected an organizing master, who should itinerate among the schools, giving the benefit of his superior knowledge of method.

Subjects and Method.—As to subjects to be taught, we have little to say to that class of E. S. which continue the work of the day school. It is to be presumed that practical instruction (and what else should be aimed at in such schools?) will embrace the elements of those sciences which bear most directly on life. We refer to social economy and the laws of health. E. S. of the humbler and more urgent sort will necessarily confine themselves to reading, writing, and arithmetic, inventing such methods of teaching those subjects as will most directly touch the intelligence and engage the interest. The short period of attendance requires that *much* be done rather than *many things*. Through a well-constructed course of reading-books (unfortunately, there is no reading series for adults worthy of mention), all the general culture and specific information attainable will best be given. If such reading-books do not furnish adequate information on social economy in its domestic and its wider social relations, and on the laws of health, they sadly misunderstand their position in educational literature. Instruction in writing and arithmetic should be given in such a way as will naturally connect itself with the lives and daily necessities of the learners. But this is not the place to treat of the subject of method.

History.—Although we have directed attention to the fact that Bishop Hinds was the first in Gr. Britain to advocate state recognition for E. S., he was by no means the first to feel the necessity that existed for them. The first school established exclusively for adults was at Bala, Merionethshire, in 1811, by the Rev. T. Charles. In 1812, a similar school was set on foot in Bristol by William Smith and Stephen Prout, a school which led to the establishment of the "Bristol institution for instructing adults to read the Holy Scriptures." In 1813, writing was included in the school programme; and in 1816, a society of the same kind was founded in London. In the course of a few years, 30 towns possessed similar schools. The first *evening* school proper for instructing boys and girls who had to work all day for a livelihood, was founded in 1806 at Bristol, by the "benevolent evening schools' society."

In other countries of Europe, E. S. where they exist, have mainly in view the continuance of the education already received in primary schools. In France, however, the wants of untaught adults have been provided for by the establishment by law of E. S. suited to them. In all the states of Germany, provision is made more or less in the country districts, and always in the large towns, for continuing the instruction given in the primary schools. Schools for those who wish to learn reading and writing for the first time seem scarcely to exist, probably because they are not needed. The schools which do exist have a greater affinity to our mechanics' institutes than to any other kind of institution in this country. The instruction is given on Sundays and holidays, and in many places also on one or two evenings in the week. But Sunday instruction seems alone to have been originally contemplated. The subjects taught are the ordinary branches, with geography, free-hand and geometrical drawing, geometry, and in some cases the elements of natural science and the laws of health. These institutions are supported by the funds of the commune or district; in some cases supplemented by the state. See EDUCATION, COMMON SCHOOLS, MANUAL TRAINING.

EVERDINGEN, ALLART VON, 1621-75; a Dutch painter of coast and inland scenery, particularly of Norway, where he suffered shipwreck. His favorite theme was a fall in a glen, with mournful fringes of pines interspersed with birch, and log huts at the base of rocks and craggy slopes. The water in his scenes tumbles over the foreground so as to entitle the painter to the name of "inventor of cascades."

EVEREST, Sir GEORGE, 1790-1866; b. Wales. He was employed in various engineering works in India, was assistant to the chief in the trigonometrical survey of that country, and on the chief's death became his successor. Afterwards he was surveyor-general of India. He gave his name to the mountain named in the next article.

EVEREST, MOUNT, in the Himalaya range in Nepaul, Asia; the highest mountain peak on the earth, so far as known. A careful measurement in 1856 made its height 29,002 ft. above tide, or within 38 ft. of $5\frac{1}{2}$ English miles.

EVERETT, ALEXANDER HILL, an American diplomatist and author, was b. at Boston, Mass., 19th Mar., 1792, and entered Harvard college in 1802. In 1806, although the youngest of the *alumni*, he graduated with the highest honors. After practicing for some time as a lawyer, he was appointed U. S. ambassador at the Hague in 1818; and went in the same capacity to Spain in 1825. Four years afterwards, he returned to the United States, where he became proprietor and editor of *The North American Review* (1830-35), and also occupied a seat in the legislature of Massachusetts. In the winter of 1840, he resided, as a confidential agent of the U. S. government, in the island of Cuba. He sailed for China as minister-plenipotentiary for that empire in 1845, and died at Canton, June 23, 1847. E. was a man of great versatility of talent and of extensive erudition. Politics and belles-lettres, political economy and poetry, statistics and æsthetics, alternately engaged his thoughts and pen. His writings are—*Europe, or a General Survey of the Political Situation of the Principal Powers*, etc. (London and Boston, 1822); *New Ideas on Population*, etc. (London and Boston, 1822); *America, or a General Survey of the Political Situation of the several Powers of the Western Continent*, etc. (Phila. 1827), in which he labors to show that Russia and the United States must in the long-run share the continent between them; *Critical and Miscellaneous Essays* (two series, Boston, 1845 and 1847). These are on a vast variety of subjects, and are probably the most interesting productions of his pen. E. also published a volume of poems in 1845.

EVERETT, EDWARD, LL.D., was born in Dorchester, Mass., April 11, 1794; d. Boston, Jan. 15, 1865; an American statesman, orator, and scholar, son of Rev. Oliver Everett. He was at one time a pupil in a Boston school, of which Daniel Webster, in the absence of his brother Ezekiel, was the teacher. In 1811, when only 17 years of age, he graduated at Harvard with the highest honors of his class. While an undergraduate he had the principal charge of a students' paper called the *Harvard Lyceum*. In 1812, he was appointed tutor at Harvard, and while thus employed, found time to prepare himself for the ministry. He was ordained pastor of the Brattle street church (Unitarian) in Boston, Feb. 19, 1814. As a preacher his career was brilliant, though brief. He resigned his pulpit at the end of 13 months, when not quite 21 years of age, having accepted the Eliot professorship of Greek literature at Harvard. To fit himself more completely for his new position, he went to Europe and studied for two years in the university of Göttingen, receiving the degree of PH.D. He then traveled extensively in England and upon the continent, making special visits to Athens and Constantinople. In England he made the acquaintance of the most eminent men of that day, Scott, Jeffrey, Romilly, and Davy. His range of study during his residence abroad was wide, embracing not only the branches included in his professorship, but a close examination of civil and political law, and of the European systems of government. Upon his return in 1819, he entered upon the duties of his professorship, delivering at the outset a course of lectures on ancient Greece, its architecture and ruins, which he afterwards repeated in Boston. During the period of his professorship, which continued till 1825, he became the editor of the *North American Review*, to which he contributed a great number of articles. In

1824, in the presence of Gen. Lafayette, he delivered the Phi Beta Kappa oration at Harvard, winning new fame by his thoughtful and eloquent presentation of the theme, "Circumstances Favorable to the Progress of Literature in America." On the 22d of Dec. of the same year, he delivered an oration at Plymouth that kindled for him a wide popular enthusiasm. In the same year (1824) he was elected to congress from the Cambridge district. He was subsequently re-elected for four successive terms, making his whole period of service in that body 10 years. During this whole term he was a member of the committee on foreign relations, and in the 20th congress its chairman. He also served on the library committee, and generally on that for public buildings. He was also a member of some important select committees. His familiarity with the science of government and with the public questions of the time, united with his high literary qualifications, and his acknowledged power as a speaker, fitted him for great usefulness in committees and upon the floor. Some utterances are on record which may be taken as early indications of his subsequent position on the question of slavery. On the 9th of Mar., 1826, he brought upon himself the rebuke of Churchill C. Cambreling, member from New York, but a native of South Carolina, for these words: "The great relation of servitude, in some form or other, with greater or less departure from the theoretic equality of men, is inseparable from our nature. Domestic slavery is not, in my judgment, to be set down as an immoral and irreligious relation. It is a condition of life as well as any other to be justified by morality, religion, and international law." "Sir, I am no soldier. My habits and education are very unmillitary; but there is no cause in which I would sooner buckle a knapsack on my back, and put a musket on my shoulder, than that of putting down a servile insurrection at the south." In 1835, he was elected governor of Massachusetts, holding the office by annual re-election until 1840, when he was defeated by a single vote. In his first message to the legislature, Jan., 1836, he took occasion to refer in deprecatory terms to the anti-slavery excitement of that day, and, alluding to the anti-slavery papers, which were almost universally denounced as "incendiary," he said: "Whatever by direct and necessary operation is calculated to excite an insurrection among the slaves has been held by highly respectable legal authority an offense against the peace of the commonwealth, which may be prosecuted as a misdemeanor at common law." As the governor was known to have at that moment in his official possession, to be communicated to the legislature, the official demands of several of the southern states for the enactment by northern legislatures of laws to suppress the anti-slavery societies and journals, this portion of his message created much excitement in the state, and intense alarm in the anti-slavery party. Remonstrances in large numbers, against the adoption of the proposed legislation, were sent to the legislature, and the remonstrants were accorded a public hearing before a special committee. After a severe struggle, the contemplated restriction of the freedom of the press was averted, and no effort was ever made to enforce the governor's suggestion in regard to proceedings under the common law for the same object. While in congress, Mr. E. was a constant contributor to the *North American Review*, and among his papers published therein, was one in which he very ably and successfully controverted the South Carolina doctrine of nullification. In 1841, he was appointed by President Harrison minister plenipotentiary of the United States to Great Britain. The news of this appointment reached him in Italy, whither he had gone for the purpose of engaging in historical work. He hastened to obey the call of his country, and entered at once upon the discharge of his official duties. The relations of this country with England at that time involved our minister in very grave responsibilities, which Mr. E. discharged in a manner creditable alike to the country and to himself. Returning home in 1845, he reluctantly accepted the presidency of Harvard university, giving the next three years to strenuous labor in behalf of his alma mater. After his resignation, he established himself in Boston with the purpose of entering upon literary tasks long postponed. He prepared a collected edition of his own orations and speeches, which appeared in 1850. He also edited a new edition of the works of Webster, at his special request, and prepared a memoir of the author. From such congenial labors he was next summoned to fill the place of secretary of state in the cabinet of President Fillmore, made vacant by Mr. Webster's death. He held this position only four months, retiring at the close of President Fillmore's administration; but during this time several important questions of state received his careful attention. Before leaving the department of state he was elected to the U. S. senate. Feb. 8, 1854, he made a powerful speech in the senate in opposition to the abrogation of the Missouri compromise of 1820, which prohibited slavery in all the territories ceded by France to the United States n. of the line of 36° 30'. The object of this abrogation was to open to slavery the territories of Kansas and Nebraska. Mr. Everett having been a conspicuous supporter of Webster and the compromises of 1850, was in a position to make his influence felt upon this new issue, but the measure was carried in spite of his eloquent remonstrances. His health failing, he resigned his seat in the senate in May and retired to private life. After recovering his strength, he devoted himself for several years to the work of procuring funds wherewith to purchase Mount Vernon, the home and burial-place of Washington, to be held in perpetuity as a place of resort and pilgrimage. He prepared an eloquent discourse upon the life and character of Washington, which he delivered nearly one hundred and fifty times in different places in the country, devoting the proceeds to this

object. He also engaged to contribute an article weekly for one year to the *New York Ledger* for \$10,000, to be paid by the proprietor to the Mount Vernon fund. The articles were afterwards republished in a volume entitled *Mount Vernon Papers*. Giving his time gratuitously and paying his own traveling expenses, he raised over \$100,000 in all for the Mount Vernon fund. He subsequently, by similar methods, obtained considerable sums for several public charities. In 1860, he was nominated for vice-president of the United States, with John Bell of Tennessee for president, by a small remnant of the whig party, which had fallen to pieces under the growing anti-slavery sentiment of that period. The ticket received 590,631 votes from a total of 4,662,170. When the civil war broke out in 1861, he took his stand promptly among those who determined to maintain the union at every hazard. His patriotic addresses at this crisis were of great service, influencing as they did a large body of conservative men, who, like himself, had done all in their power to discourage and resist anti-slavery agitation. His oration at the consecration of the national cemetery at Gettysburg, Penn., Nov. 15, 1863, was a production creditable alike to his patriotism and his high literary ability. In the great crisis of 1864, when Lincoln was re-elected, Mr. Everett's name headed the list of presidential electors of Massachusetts, and his vote for Lincoln was the last act in his political career. Jan. 9, 1865, he spoke in Faneuil Hall in behalf of the needy and suffering citizens of Savannah, and on the following Sunday, the 15th, he died. He received the highest literary honors from the great English universities as well as from his alma mater. He was a corresponding member of the institute of France, and enjoyed the friendship of the greatest men of his time in Europe and America. A statue of him by Ball stands in the Boston public library, and another, by Story, in the public garden.

EVERETT, a city in Middlesex co., Mass., 3 m. n. of Boston; a part of the town of Malden till 1870; incorporated as a city in 1893. It is on the Boston and Maine railroad and has electric railroad connection with Boston, Melrose, Wakefield, Lowell, Lynn, and Salem. It contains several churches, public schools, a high-school, public library, savings bank, weekly newspapers, and a young ladies' seminary. The city contains a number of manufactories, the principal articles being chemicals, bicycles, baby carriages, phosphates, wheels, rope, foundry products, roofing materials, furniture, and varnish. Pop. '90, 11,068.

EVERETT, WILLIAM, b. 1839; youngest son of Edward Everett, graduated at Harvard college, 1859, and at Trinity college, Cambridge, England, in 1863; studied law; was assistant professor of Latin in Harvard college, 1863-81, and in 1882 was made principal of the Adams academy, Quincy, Mass. He published *On the Cam*, lectures (1865) giving his experience at Cambridge; *Changing Base* (1868); *Hesione*, or *Europe Unchained*, poem (1869); *Double Play* (1870); *School Sermons* (1881), and some other books for boys. He was elected a member of Congress as a democrat in 1892, and declined a renomination.

EVERGLADES, a peculiar swampy region in s. Florida, in Dade and Monroe cos., about 160 m. long by 60 m. wide, s. of lake Okeechobee. The E. consist of a vast number of small and low islands, separated by channels in which the water is usually shallow. The islands are covered with dense thickets of pines, palmettoes, vines, and tropical shrubs, and the soil is very fertile. The water in the channels is concealed by tall grass. The country is almost entirely wild, and abounds in small game. A few Seminole Indians still inhabit the region. During the Seminole War in 1835, these Indians ambushed and destroyed in the Everglades a body of United States troops under Major Dade; and were not driven from these swamps until after a struggle which cost the Government fully \$10,000,000, and 1500 men.

EVER GREEN ISLE. See IRELAND.

EVERGREENS are those trees and shrubs of which the leaves do not fall off in autumn, but retain their freshness and verdure throughout the winter, and perform their functions during more than one season. Evergreen leaves are generally of thicker and firmer texture than the leaves of deciduous trees and shrubs. They have also fewer pores or *stomata* (q.v.), and these confined to their under surface. Evergreen leaves are sometimes very small, as in firs and heaths; sometimes pretty large, as in rhododendrons, laurels, magnolias, etc. E., both trees and shrubs, have always been much sought after by the landscape gardener, and for purposes of ornament and shelter. Some orders of plants consist exclusively, or nearly so, of E., whilst in others they exist only as exceptional species. Most of the *coniferae* are E., and the somber green of pines, firs, cypresses, etc., is a prevalent characteristic of northern scenery both in summer and winter; whilst the undiminished thickness of the foliage affords winter shelter to animals which could not so well exist in forests composed merely of deciduous trees. Holly and ivy are amongst the finest of them; the box, privet, and different kinds of bay and laurel, rhododendron, phyllirea, myrtle, etc., are also familiar to every one. As instances of genera in which some species are evergreen and others deciduous, may be mentioned barberry and cytisus. Many fine new ornamental E. have recently been introduced. As suitable for imparting a lively appearance, boughs of E. are largely employed in America to decorate the walls of public places of assemblage, triumphal arches, etc., on festive occasions, and the various species of lycopodium or *club moss* are extensively wrought into wreaths and garlands for similar purposes, especially at Christmas time. Among the many foreign coniferous evergreen

trees planted in gardens in the United States are the silver spruce, *abies argentea*; the Norway spruce, *abies excelsa*; the narrow-leaved spruce, *abies tenuifolia*; the mountain yew, *cephalotaxus montana*; the Japan weeping cypress, *cryptomeria Japonica*; the English juniper, *juniperus communis*; the Japan juniper, *juniperus Japonica*; the European silver fir, *picea pectinata*; the Scotch pine, *pinus sylvestris*; the English yew, *taxus vaccata*; the weeping yew, *taxus Dovastonii pendula*; the Japan arbor vitæ, *thuya Japonica*; and the Chinese arbor vitæ, *thuya Orientalis*.

The more plentiful and important of evergreen trees and plants native in the United States are given in the following list :

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|---------------------------------|---------------------------------|
| White Spruce..... | <i>Abies alba.</i> |
| Hemlock..... | <i>Abies Canadensis.</i> |
| California Spruce..... | <i>Abies amabilis.</i> |
| Douglass Spruce..... | <i>Abies Douglassii.</i> |
| Mexican Spruce..... | <i>Abies Mexicana.</i> |
| Black Spruce..... | <i>Abies nigra.</i> |
| Red Spruce..... | <i>Abies rubra.</i> |
| Sabine's California Spruce..... | <i>Abies Sabini.</i> |
| California White Cedar..... | <i>Libocedrus decurrens.</i> |
| White Cedar..... | <i>Cupressus thyoides.</i> |
| Great Coned Cypress..... | <i>Cupressus macrocarpa.</i> |
| Mexican Cypress..... | <i>Cupressus Mexicana.</i> |
| Red Cedar..... | <i>Juniperus Virginiana.</i> |
| Great Flowered Magnolia..... | <i>Magnolia grandiflora.</i> |
| Balsam Fir..... | <i>Abies balsamea.</i> |
| California Noble Fir..... | <i>Abies nobilis.</i> |
| White Pine..... | <i>Pinus strobus.</i> |
| Yellow Pine..... | <i>Pinus mitis.</i> |
| California Yellow Pine..... | <i>Pinus brachypterus.</i> |
| California Nut Pine..... | <i>Pinus edulis.</i> |
| Jersey Pine..... | <i>Pinus inops.</i> |
| Scrub Pine..... | <i>Pinus Banksiana.</i> |
| Pitch Pine..... | <i>Pinus rigida.</i> |
| Long-leaved Pine..... | <i>Pinus australis.</i> |
| Pond Pine..... | <i>Pinus serotina.</i> |
| Spruce Pine..... | <i>Pinus glabra.</i> |
| Mountain Pine..... | <i>Pinus pungens.</i> |
| Loblolly Pine..... | <i>Pinus taeda.</i> |
| Lambert's Californian..... | <i>Pinus Lambertiana.</i> |
| Red Pine..... | <i>Pinus resinosa.</i> |
| Bald Cypress..... | <i>Taxodium distichum.</i> |
| American Yew..... | <i>Taxus baccata Canadensis</i> |
| Florida Yew..... | <i>Taxus Floridana.</i> |
| American Arbor Vitæ..... | <i>Thuya occidentalis.</i> |
| Giant Arbor Vitæ..... | <i>Thuya gigantea.</i> |
| California Torreya..... | <i>Torreya Californica.</i> |
| Great California tree..... | <i>Sequoia gigantea.</i> |
| Redwood..... | <i>Sequoia sempervirens.</i> |

EVERLASTING FLOWER, the popular name of certain plants, the flowers of which suffer little change of appearance in drying, and may be kept for years without much diminution of beauty. They are plants of the order *compositæ*, having their flowers (heads of flowers) surrounded with an involucre; the scales of which resemble the petals of a corolla, but are rigid, membranous, and contain little moisture. Some species of cudweed (q.v.) (*gnaphalium*) are often called E. F., and the other plants which bear the name belong to nearly allied genera, but particularly to the genus *helichrysum*, which contains a great number of species, mostly natives of Africa. *H. arenarium* is frequent on dry sandy soils in many parts of Europe and the central latitudes of Asia. It is covered with a gray felted down, and has yellow flowers, which, when rubbed, emit a faint aromatic odor. The French call them *immortelles*, and in France they are often woven into circular wreaths, and placed beside recent graves, as emblems of immortality.

EVERSLEY, CHARLES SHAW LEFEVRE, Viscount, ex-speaker of the house of commons, was b. in 1794, and descended maternally from the Lefevres who went to England from Rouen on the revocation of the edict of Nantes. He was educated at Winchester and Trinity college, Cambridge, called to the bar at Lincoln's Inn in 1819, entered parliament in 1830, as a member for Downton, and represented Hants from 1831 to 1857. In 1839, he was chosen speaker of the house of commons; and re-elected in the parliaments of 1841, 1847, and 1852. He retired from the office in 1857, with a peerage and a pension of £4,000 a year. During the eighteen years of his speakership, he suggested and carried out many improvements in the forms and procedure of the lower house, tending to the dispatch of business. Tall, and dignified in person, affable and accessible to the younger members, and profoundly versed in the laws of debate and practice.

of the house, he was admirably qualified, by nature and training, to be "first commoner of England." He d. in 1888.

EVESHAM, originally **EOVESHAM**, a municipal and parliamentary borough in the s.e. of Worcestershire, on the right bank of the navigable Avon, 15 m. s.e. of Worcester. It lies in a beautiful and fertile vale, and has for many years been noted for market-gardening. Pop. 91, 5836. Till 1885, E. sent one member to Parliament. An abbey was founded here about 700. It was the scene of Simon de Montfort's defeat by the royal troops in 1265, terminating the Barons' War.

EVICTION, in the law of Scotland, is the dispossessing one of property, whether in land or movables, in virtue of a preferable title in the person of him by whom the eviction is made. The same expression is used in England as to property in land; but where the tenant is merely deprived of possession, it is called ouster.

EVIDENCE, LEGAL. Evidence is either parol or written, the former consisting of the statements of witnesses appearing personally in court, and which statements must be attested by an oath or solemn declaration; the latter consisting of records, deeds, and other writings.

A distinction—popular rather than legal—is commonly drawn between *direct* and *circumstantial* evidence. Evidence is said to be direct when the proof depends on the testimony of persons who swear to the fact in dispute as matter of personal knowledge; when the witnesses only swear to other facts from which the fact at issue may be inferred, the evidence is called circumstantial. The latter kind of evidence is usually regarded as inferior in value to direct. Yet it is sometimes held that circumstantial evidence may be the more trustworthy; for either the witnesses may be unaccountably mistaken, or may have designed to deceive, whereas, as Paley said, "circumstances cannot lie."

The tendency, both in England and Scotland, of late years, has been to abolish all restrictions on the admissibility of witnesses, and to bring the rule practically to what Blackstone stated it to be in theory, viz., "all witnesses that have the use of their reason are to be received and examined." The ground on which witnesses were formerly excluded was untrustworthiness, arising either from the character of the witnesses or their interest in the suit. Under the former head fell those who were legally infamous (q.v.); whilst the latter included, first, the party to the suit himself, and then all who were connected with him by the ties of family, or even of business, in any appreciable degree. Gradually, however, it came to be seen that, though witnesses subject to these objections were less valuable than others to the party adducing them, it by no means followed that their testimony was of no value at all, and that the safer course in all cases was to examine them, and then to allow their testimony to be invalidated by proof of their interest in the cause direct or indirect, or of their having been convicted of such crimes as to render it unlikely that they should speak the truth. The objections have thus become objections not to the admissibility or competency, but to the credibility of witnesses. The first of the very important statutes by which these changes were effected was 9 Geo. IV. c. 32, which permitted Quakers and Moravians to substitute a solemn affirmation for an oath; admitted the party whose name had been forged as a witness in prosecutions for forgery; and provided that no misdemeanor (except perjury) shall render a party an incompetent witness after he has undergone the punishment. Then came the Scotch act 3 and 4 Vict. c. 59, afterwards referred to, and the English act 6 and 7 Vict. c. 85, which provided that no person offered as a witness shall hereafter be excluded, by reason of incapacity from crime or interest, from giving evidence either in person or by deposition on any issue or inquiry civil or criminal, but shall be admitted notwithstanding he may have an interest in the matter in question, or in the event of the trial or proceeding, and notwithstanding that he may have been previously convicted of any crime or offense. The same principle was extended by 14 and 15 Vict. c. 99 to the parties to a cause, who are not only competent, but compellable to give evidence on behalf of either or any of the parties—subject only to exception where the question tends to criminate the person examined, or where one (now altered) sued for breach of promise of marriage, or any action or proceeding instituted in consequence of adultery. By 16 and 17 Vict. c. 83, the former statute, 14 and 15 Vict. c. 99, was amended to the effect that the husband or wife of the party shall be in the same position with the party himself, subject only to these exceptions—first, that the husband or wife cannot give evidence for or against each other in criminal proceedings (but now they may in suits for adultery), and that they cannot be compelled to disclose matters which they have learned by communications from each other during the marriage. The statutes by which the corresponding changes were effected in Scotland were 3 and 4 Vict. c. 59, 15 and 16 Vict. c. 27, and 16 and 17 Vict. c. 20.

The oath (q.v.) to "speak the truth, the whole truth, and nothing but the truth," is administered to witnesses in England on the New Testament; in Scotland, holding up the right hand. Quakers and all conscientious persons, of whatever religious denomination, who object to the use of an oath, as formerly observed, make a solemn affirmation (q.v.); and persons who are foreigners are sworn, or otherwise bound over to speak the truth, by such forms as are conceived to be appropriate to their respective creeds. The test of the amount of religious belief which will suffice to render a witness admissible, has been generally considered to be a belief in future rewards and punishments:

but there is no decision which fixes the point, and in England, belief in a God, and that divine punishment will be the certain consequence of perjury here or hereafter, is enough. To obviate captious objections, the sacredness of oaths was secured by 1 and 2 Vict. c. 105, which provides that all persons shall be bound by the oath administered in the form and with such ceremonies as such persons shall declare to be binding.

It is a general rule of the law of evidence, that a witness is not bound to criminate himself, and he may consequently decline to answer any question that tends to expose him to punishment as a criminal, or to penal liability, or to forfeiture of any kind. If the effect of the question be merely to establish that he owes a debt, or is otherwise subject to a civil suit, the exception will not hold, and he will be bound to answer it (46 Geo. III. c. 37). The rule in England is, that a counsel, attorney, or solicitor is not bound, or even entitled, to divulge the secrets of the cause with which he has been intrusted; and the recent Scottish act 15 and 16 Vict. c. 27, s. 1, preserves the same exception with reference to agents who shall at the time when so adduced be acting in that capacity. Neither can official persons be called upon to disclose matters of state, the publication of which might be prejudicial to the community. All other professional persons, however—lawyers not engaged in the cause, physicians, surgeons, and divines, must divulge all secrets relevant to the issue with which they have become acquainted, even in the strictest professional confidence. See CONFESSIOAL. Neither will a servant nor private friend be allowed to withhold a relevant act, though of the most delicate nature.

One witness in England is sufficient in law, unless in the case of treason, if juries believe him, and in long chains of evidence it is often impossible that more than one witness should be adduced to make out some of the links of it. In general, however, there will be some fact or circumstance which will act as a supplementary adminicle, if the testimony be reliable; and it is this fact which has rendered the practical effect of the opposite rule, which demands two witnesses, in Scotland, not very different. The want of a second witness is usually supplied by a witness to circumstances which are corroborative of the evidence of the first; and where the one witness is not so corroborated in England, he will rarely be believed. It is a rule that none but the best evidence shall be adduced, which means that secondary shall not be substituted for primary evidence where the latter is accessible; a rule founded on the presumption that such a substitution is probably prompted by a sinister motive. This rule applies to written as well as oral testimony, and excludes copies of documents, just as it excludes the "hearsay" of witnesses. The best works on evidence in English are Taylor (English), Greenleaf (American), and Dickson (Scotch).

Evidence, in American law, embraces all statements which a court permits or requires to be made by witnesses in relation to matters of fact pertaining to the case on trial, and all documents produced for the inspection of the court. The former is distinguished as *parol*, the latter as *written evidence*. Again, evidence is either *direct* or *circumstantial*. When a witness testifies to a fact in issue from his own personal knowledge, his evidence is *direct*; when he swears to other facts, from which the existence of the fact at issue is inferred, it is *circumstantial*. Generally *direct evidence* has more force than *circumstantial*, though the latter is sometimes of such weight as to carry conviction to a court or jury. Both are to be taken with some allowance for possible mistake or falsehood on the part of the witness. Evidence must be relevant to the issue, though it may embrace incidents in themselves irrelevant, but which are among the necessary surroundings of the fact to be proved. The contents of a document must be proved by the document itself if it be accessible; if not, then by a certified copy, or by oral evidence; the law requiring the "best evidence" procurable in each case. When a contract has been reduced to writing, *parol evidence* cannot be admitted to prove its contents; still less can any variations of its terms be thus proved. Courts presume, until the contrary is proved, that a document was executed on the day of its date. Alterations and interlineations in a deed are presumed to have been made before execution, but in respect to wills the rule is reversed. When the law requires an instrument, e.g., a will, to be attested, it cannot be used in evidence unless one attesting witness be called to prove its execution if such a witness be alive and capable of giving evidence. If there be no such witness, then the signature of at least one attesting witness, and of the person executing the deed, must be proved to be in their respective hand-writings. A will thirty years old is held to prove itself; that is, there is a presumption in favor of its validity. The burden of proof lies on the person who asserts the affirmative. A presumption on the part of a court can be set aside only by evidence, and the burden of proof rests upon the party making denial. In criminal cases—in trials for murder, for instance—malice is presumed and requires to be rebutted by evidence. A person who has not been heard of for seven years, unless the circumstances are such as to account otherwise for his absence, is presumed in law to be dead. His wife may marry again without liability to punishment for bigamy. The effect of presumption is to establish against a party a conclusion which stands until he disproves it. In many states uninterrupted, undisputed possession for 20 years is held to establish a title to real estate. In some states a shorter period is sufficient. By the common law, if a wife commits a felony, other than murder or treason, in the presence of her husband, she is not criminally liable, it being assumed that she was under coercion. This rule is greatly restricted in practice in the United States. It is a rule of law, to which, how-

ever, there are some qualifications, that a witness cannot testify to what he has heard another say, but to only what he himself knows. One of the exceptions to this rule is that the dying declarations of a murdered person as to the causes of his death and the person who committed the murder may be given in evidence by one who heard them. If a witness testify in a trial, his evidence may be proved in a subsequent trial. When doubts arise respecting the boundaries of land, or the pedigree of persons, and the question is material to determine the issue before the court, traditional evidence—in other words, declarations made long ago by persons supposed to have had knowledge of the subject—is sometimes admitted. The ordinary witness is confined to statements of fact; he cannot give an opinion, or state the inferences he draws from the facts within his knowledge. An “expert”—one skilled in some art or profession—is allowed and even required to give opinions as to the significance of facts whose meaning is not fully understood by a court or jury; e.g., a chemist may testify as to the effects of certain poisons upon the human system, or a surgeon may say whether in his opinion there has been malpractice in treating a wound. For reasons of public policy, the confidential communications between an attorney and client and between a husband and wife are excluded. “Secrets of state” and the deliberation of judges and juries are exempt from judicial investigation. A witness within the jurisdiction of the court is required to attend in person; if he be beyond the jurisdiction his testimony is taken by commission. Formerly parties to an action and others interested therein were not allowed to be witnesses, but they are now generally admitted, it being assumed that courts and juries will give due weight to the temptation which such witnesses may be under to swerve from the truth in their own interest. Persons of a defective understanding, or who are supposed to be insensible to the obligations of an oath, are held to be incompetent as witnesses. Persons convicted of an infamous crime are generally excluded. The tendency of law at present, however, is to widen the range of evidence as far as possible, and to regard many of the former grounds of exclusion as concerning not the admissibility but only the credibility of a witness. The party calling a witness is not allowed to ask him “leading questions”—i.e., questions which suggest their answers. The other party on cross-examination is not bound by this rule. A witness is not required to answer questions, when in doing so he must criminate himself. A witness may be impeached by proving that his reputation for truth and veracity is bad. See AFFIRMATION; DEED; DYING DECLARATION; FRIENDS; HEARSAY EVIDENCE; JURY; JURY TRIAL; OATH; PERJURY; SUBORNATION OF PERJURY; SUBPOENA; WITNESS.

EVIDENCES OF CHRISTIANITY. Christianity is the religion growing out of a divine revelation, the giving of which, in successive stages, extended from a remote period in the past to about one hundred years after the birth of Jesus Christ. From the beginning of the revelation to the present time it has been engaged in severe conflicts with the mightiest forces, and with whatever immediate outward result, it has maintained its hold on the human mind and has advanced in power. Thus the conflicts themselves become important factors in the strength of the evidences by which the authority of the revelation is upheld. 1. Moses, as a bearer of a part of the revelation, was brought into conflict with the Egyptians and inflicted on them, instrumentally, without human help, judgments and sufferings, the result of which was the deliverance of the Israelites from bondage, and the memorial of which is the Passover, instituted at the time and observed to this day by the Jews scattered over the world. 2. Moses came also into conflict with the barrenness of the wilderness, in providing for the sustenance of the Israelites, and with their turbulence and rebellion during their sojourn and wanderings there. The memorials of these conflicts are the wilderness itself, the law given there, and the Pentateuch written there. 3. Having traversed the wilderness, Moses, Joshua, and Israel were involved in a conflict with the nations of Canaan, on both sides of the river Jordan, the result of which was the conquest of the land; and the memorial of it is the land itself, illustrated by the book of Joshua, which (as has been said) bears a relation to Palestine as conquered by the Israelites, similar to that which doomsday book bears to England as conquered by the Normans. 4. Passing by minor conflicts between the Jews and the nations around them, we take notice of the great expedition of Sennacherib, king of Assyria, against them, and of its overwhelming defeat; to both which events the harmonious witnesses are the written records of the Jews and the sculptured records of Sennacherib. 5. Nebuchadnezzar, king of Babylon, desolated the land of Canaan, destroyed Jerusalem, burned the temple, and carried the Jews captive. The result of this judgment was their deliverance from idolatry, and the memorial of it is the book of Daniel with its splendid prophecies. 6. Cyrus, the conqueror of Babylon, might also have overwhelmed the Jews, but having been shown the prophecy of Isaiah, written 150 years before, in which he was mentioned by name and his success foretold, his spirit was stirred up to restore them to their own land. The memorials of the restoration were the temple rebuilt at Jerusalem and the synagogues erected throughout the land. 7. Alexander, in his rapid career of conquest, appeared before Jerusalem in anger against the Jews because they placed obstacles in his way. But when he was shown the prophecies of Daniel concerning the king of Grecia who was to conquer Persia, his anger giving way to joy, he treated the Jews kindly and placed many of them in the new cities that he built. Memorials of his change of feel-

ing towards them were furnished by Jewish synagogues built in the Greek cities and the Jewish Scriptures translated into the Greek tongue. 8. Antiochus the Great, one of Alexander's successors, seized Jerusalem and desecrated the temple by offering heathen sacrifices therein. His course awakened the zeal of the Jews and imparted new life and purity to their religion. A memorial of this reformation was furnished by the restoration of royal government to the Jews. 9. The Romans next obtained entrance into Jerusalem and established their power over the land. For a time they gave regal and vice-regal authority to Herod and his successors. Afterwards they made Judea a province and continued to hold it until, on the revolt of the Jews, they destroyed the city and the temple, and sold the inhabitants as slaves. In the midst of this Roman domination the crowning event of human history occurred—THE ADVENT OF JESUS CHRIST THE SON OF GOD; and the still-enduring memorials of it are Jerusalem trodden down by the Gentiles and the going forth out of it of Christianity, strictly so called, unaided by physical power, to gain possession of the world. 10. Its first conflict, in this form, was sustained by Jesus himself against the chief forces of the Jews among whom he came. His visible power consisted in a holy and unselfish life, in words of instruction surpassing all that men have ever spoken, and in beneficent works transcending all that men have ever wrought. The first result of this conflict was, apparently, his defeat by the Jews, for, aided by the Romans, they accomplished the death of Jesus and his burial in a sealed and guarded tomb. But the conflict was renewed by his followers, who offered themselves as witnesses of his resurrection and produced conviction in the minds of thousands of Jews, while also they aroused hostility in the hearts of many others. As the preaching of "Jesus and the resurrection" spread into other cities and lands, the conflict with Jews was continued, producing, as before, conviction in many minds and also hostility in many hearts. And to this day, Christianity and the Jews are arrayed against each other in many lands. 11. Its next conflict was with heathenism in union with the state. Proclaimed, almost immediately, as a gospel for the nations, it was opposed by the adherents of all idolatrous religions rallying against it as a common enemy, and by the governing classes, whose jurisdiction in religious matters (as they thought) it usurped. Yet it prevailed from city to city and from land to land. Heathen temples were almost deserted, and the fires of sacrifice on their altars went out. Trophies of the victory were furnished by the acts and writings of the apostles, by the planting and growth of churches, the joyful death of martyrs, the courage of confessors, and the argumentative defenses of learned men. If at the moment of triumph, in the council of Nicæa, the presence of the emperor Constantine—assuming, in some sense, to be the head of the assembly—was a fatal mistake, introduced from the heathenism which he had as yet scarcely left, let it not be forgotten that many of the bishops who rose to receive him were marked with bodily mutilations or scars, the tokens of their fidelity to Christ. 12. The next conflict of Christianity was with philosophy. While it contended only with Jewish and idolatrous rites, philosophers treated it with contempt and easily remained ignorant concerning it. But in its advance it awakened the hostility of Celsus, Porphyry, and others, who attacked it as false and mischievous; and, on the other hand, Justin Martyr, its first great defender among uninspired men, wore a philosopher's robe. From this point forward Christianity continued to be opposed by many in the ranks of philosophers and to be corrupted by the admixture with it of the philosophic opinions prevalent around it. 13. Christianity contended, also, with barbarism rude and strong. In the ages that followed the inroad of the northern tribes on Rome this religion was the only power that held them in check, tempering their fierceness and finally subduing them to the obedience of faith. Yet here also, as in its contests with Judaism, paganism, and philosophy, it was itself corrupted by admixture with the opinions and habits of those who received it. 14. Its next great conflict was with Mohammedanism. The Saracens were overrunning Christendom with the sword and the Koran from the east and south, but in the west the barbarians who had become Christians broke their power and poured the forces of Europe upon the Holy Land. And from those times to the present the "eastern question," in some form, has arrayed Christian Europe against Mohammedan rule. 15. The next great conflict was in Christendom itself. The corruptions which had been introduced from the worldly power of Rome, from heathen idolatries, philosophic opinions, and barbarian superstitions, accumulated and grew until Christianity became, in many respects, a baptized heathenism. But from itself, through the teaching of the recovered Scriptures, its own reformation was commenced and was followed by a conflict more extended and severe than any which had been waged against it before. And after more than three centuries and a half this conflict has not ceased. 16. Its next conflict, partly occasioned by the errors of Romanism and greatly aggravated by them, has been with infidelity in various forms. The Italian infidels of the 16th c. were witnesses against themselves by their hypocrisy and vice; the English infidels of the 17th and 18th centuries were driven back by many earnest writers; the French infidels of the 18th c. hastening on the revolution and greatly increasing its horrors, condemned their own religious errors by their political crimes; the German infidels of the 19th c., striving to dissolve Christianity into fable by the power of criticism, have left its foundations as solid as before. 17. The great conflict of Christianity in the present century is with the gigantic forces of modern heathenism. Having commenced the work

in the closing years of the last century, it has ever since steadily advanced with wiser counsel, more deliberate purpose, more thorough work, more liberal expenditure, and more enlarged success, to the overthrow of all false religions. A system of religion which has been contending so long against all these mighty forces; whose progress can be traced through 3,800 years, from the point where one man held its revelation as a promise of blessing for all the world, to the present time, in which millions enjoying the blessing themselves are pressing on the fulfillment among all nations—that system of religion must have more than human strength, it must be from God. The evidences by which its divine origin is established are co-extensive with human observation, thought, and history. A portion of them may be classified as follows:

I. EXTERNAL PROOFS. 1. Miracles wrought by Moses, Christ, and the apostles. 2. Prophecies already fulfilled and yet to be fulfilled; concerning Nineveh, Babylon, Tyre, Egypt, Petra, Bashan, Moab, Philistia, Damascus; the Babylonian, Persian, Grecian, and Roman empires: concerning the Jews, their deliverance from Egypt, entrance into Canaan, captivity in Babylon, restoration to their own land, destruction of their temple and capital city, with the long period during which it would continue trodden down by the nations, their wanderings and sufferings in many lands: concerning the Christian apostasy, the seven churches of Asia, and the unfolding of human history to the last days. 3. Historical testimonies to the genuineness and authenticity of the Scriptures.

II. INTERNAL PROOFS. 1. *Doctrines*. Concerning the being, perfections, and government of God; the origin of the worlds; the creation, nature, fall, sinfulness, redemption, and immortality of man. 2. *Moral and religious precepts*. The ten commandments; sermon on the mount; ethics of the epistles. 3. The person, character, and work of Jesus Christ; and the unity of all the Scriptures in him as the divine human Savior. In the Old Testament a deliverer is promised who would be one of the human race, yet would perform a work beyond human power; would descend from Adam, Abraham, Isaac, Jacob, Judah, David; would be born in Bethlehem, of a virgin mother, yet is eternal, the mighty God and Prince of Peace; would be subjected to humiliation, sorrow, suffering, death; and, because of these things, would be raised from the dead and exalted to the right hand of God as the Savior of men. The New Testament exhibits Jesus Christ as descended, in human nature, from Adam, Abraham, Isaac, Jacob, Judah, David, and born in Bethlehem of the virgin Mary; yet as in his divine nature the Son of God, Emmanuel, God with us: as subjected to humiliation, suffering, and the cursed death of the cross; yet rising again the third day and filling the New Testament, the church and heaven with his glory as God manifest in the flesh. This exhibition of Christ in all the Scriptures is a demonstration that he is the divine Savior and that they are inspired of God.

III. Experimental proof (combining both the external and internal) furnished by the rise and continued progress of Christianity and its effects on the character, condition, and hopes of mankind. Christianity contains a revelation from the living God, was founded by a living Savior, was embraced, through the power of the Holy Spirit, by living men, so that Christians existed before organized Christian churches, before the Christian Scriptures, before Christian customs, laws, or nations. Successive generations of Christians have been continued on the earth and have furnished living evidences of Christianity. The aggregate of Christian life, character, work, and influence throughout the world from the beginning to the present time is, to-day, the culmination of the proofs that Christianity is divine. See CHRISTIANITY.

EVIL may be generally defined as that which is opposed to the divine order of the universe. It requires only a superficial observation to perceive, that there are many apparent exceptions to the pervading harmony and happiness of creation: there are convulsions in the physical world; there are suffering, decay, and death throughout the whole range of organic existence; and the appellation of E. is commonly applied to such phenomena. In the face of the human consciousness, such phenomena appear to be infractions of the general order and good, and it pronounces them *evil*. How far the internal feeling of wrong has been quickened and educated by such outward facts, it would be difficult to say, but, beyond doubt, they have exercised upon it a powerful influence. Every form of religion testifies to the recognition of evil in the external world, and superstition in all its shapes mainly rests upon it.

But it is in the sphere of moral life alone that the conception of E. can be said to hold good. After the light of science has explored the secrets of nature, and shown how all its apparent anomalies are merely manifestations of a comprehensive harmony, the idea of E. is dispelled from the material and merely organic creation. "Whatever is, is best," is seen to be everywhere the law of this creation. There remains, however, the ineradicable feeling of E. in human life and manners and history. There is in the moral consciousness of man a sense of violated order, of transgression of divine law, or what is called *sin*, which is *evil* in its essential form. This fact of E. is everywhere appealed to by the Christian religion; it is the aim of this religion to deliver men from its power and misery. Every ethical and judicial code is based upon its recognition, and is designed to protect human society from its injurious consequences. It cannot be better or more clearly defined than in the language already given, *viz.*, the transgression of the divine law revealed in conscience and in Scripture.

The question of the *origin of evil* has been greatly discussed, and received various answers. The simplest and most direct of these answers is that which maintains a double origin of things, or a system of *dualism*. This conception lies at the bases of many forms of religion; it may be said to be the fundamental conception of all mere nature-religions. Interpreting the obvious appearances of nature, they embody in divine personalities its contending manifestations of light and darkness, benignity and terror. The opposition of Ormuzd and Ahriman in the old Zoroastrian faith is one of the most conspicuous examples of this religious dualism. Manicheism, which spread so widely in the 4th and 5th centuries, and the Syrian gnosticism from which it sprung, are also historical illustrations of the same principle. See AVESTA, ZOROASTER.

The dualistic theory of the origin of E., however, could not obviously maintain itself with the advance of speculation and the spread of Christian truth. It was no less clearly a postulate of the cultivated reason than a dictate of divine revelation, that the world proceeded from One absolutely Divine Creator, holy and good, of whom, and through whom, and to whom are all things. It was necessary, therefore, to reconcile the appearance of E. with this fundamental admission.

The doctrine of the fall, especially in the later form of development which connects it with the existence of a devil or evil spirit, tempting man in the shape of a serpent, was supposed to explain the appearance of E. in human history. Being tempted of the devil, man sinned, and so fell from his obedience to the divine law. This is the doctrine of orthodox Christian theology, and the answer which it gives to the inquiry, how sin came into the world? And many minds never think of carrying the inquiry further. It is clear, however, that this explanation of the historical origin of E. leaves the question of its real and absolute origin unsettled. The devil being assumed as the cause of man's sin, the further question arises, whence the devil? Is he an absolute personality? in which case we are landed in the old theory of dualism; or is he, according to the traditional Christian conception, a fallen angel? in which case the question just returns, whence the spring of E. in him? There is no real explanation gained by this removal of the question; it is still the same difficulty—whence the origin of E. in the creation of an all-perfect being, almighty as well as all-wise and good?

Speculation may please itself with ingenious answers to this question, but in truth it admits of no satisfactory solution. Some, for example, have argued that E., like darkness or cold, is an indispensable element of alternation or contrast in human life. All individual reality is only the product of opposite forces working together. Character could only arise from the interaction of opposing ethical influences of good and evil. In nature, we have attraction and repulsion, rest and motion, positive and negative electricity; why should it be different in the sphere of morals? Here, too, there must be polarity. Good can only exist in contradistinction to E.; the one no less than the other is necessary to constitute the drama of human life and history. Others, again, have argued, that E. is the result of what is called metaphysical imperfection. God alone can be perfectly good. The creature, in its very nature, is limited, defective; and E. is nothing else than the evidence of this limitation in man. It is not something real or positive, but only a privation. It is in morals what cold and darkness are in physics, a pure negation. Thus have argued such profound thinkers as Augustine and Leibnitz. But it requires but little penetration to see that such arguments, however ingenious, and so far well founded, do not meet the essential difficulty of the problem. If E. be, according to such views, a necessary element of human life, in the one case, in order to develop its activity, in the other case, as clinging to its creaturely limitations, then plainly it is not, in the orthodox sense of the word, *evil*. It is not, and cannot be a contradiction of the true idea of human life, and at the same time a necessary element of it. Whatever necessarily belongs to life, must help its true development, and not injure and destroy it; must be *good*, in short, and not *evil*. Such theories, therefore, only solve the problem by eliminating the fact. The origin of E. must remain forever inscrutable; nor is it wonderful that it should. It is only in its ultimate sense conceivable as a quality of moral freedom, and moral freedom in man or any created being is a profound mystery. It is something which "we apprehend, but which we can neither comprehend nor communicate." See PESSIMISM.

EVIL, KING'S. See SCROFULA.

EVIL EYE. Both in ancient and modern times, the belief that some persons have the power of injuring others by looking upon them, has been widely diffused. The Greeks frequently speak of the *ophthalmos baskanos* (or E. E.), which they conceived to be especially dangerous to children; and the Romans used the verb *fascinare* to express the same fact. Pliny speaks—not on his own authority, however—of "those among the Triballians and Illyrians, who with their very eyesight can witch (*effascinate*), yea, and kill those whom they look wistly upon any long time;" and Plutarch states, on the authority of Philaretus, that "the Thybiens who inhabited Pontus were deadly, not only to babes, but to men grown, and that whomsoever their eye, speech, or breath would reach, were sure to fall sick, and pine away." Menalcas, in Virgil (*Ecl.* iii. 102), also complains that some E. E. has fascinated his young lambs—

Nescio quis teneros oculus mihi fascinat agnos.

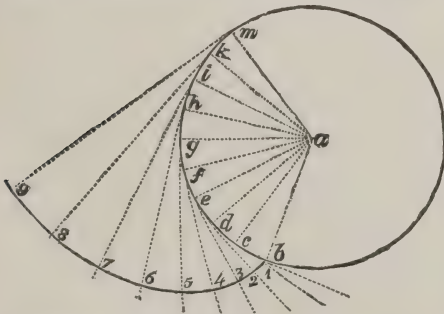
The principal amulet used by the ancients was the *phallus* or *fascinum*, as the Romans

called it, which was hung round the neck of children. Of course, this superstition, like all others, flourished in Europe during the Middle Ages. See Reginald Scot's *Discovery of Witchcraft*; the *Opusculum de Fascino* of John Lazarus Gutierrez, a Spanish physician, published in 1653; and the *Tractatus de Fascinatione* of John Christian Frommann, a physician of Saxe-Coburg, published in 1675. In the British isles, also, the belief in the power of the E. E. is of old date, and is by no means dead, at least in Ireland and the Highlands of Scotland. In these countries (as elsewhere), it was once a very common superstition that cattle were subject to injury in this way. Witches had the power to a malignant degree; and various charms, such as twining mountain-ash among the hair of the cow's tail, were used to avert or destroy their noxious influence. In the east it was and is no less prevalent. The Persians have various methods of discovering the special kind of fascination by which a person is afflicted; and Dallaway, in his *Account of Constantinople* (Lond. 1797) affirms that "nothing can exceed the superstition of the Turks respecting the E. E. of an enemy or infidel. Passages from the Koran are painted on the outside of the houses, globes of glass are suspended from the ceiling, and a part of the superfluous caparison of their horses is designed to attract attention, and divert a sinister influence." Hobhouse, in his *Travels*, bears equally conclusive testimony to the prevalence of this superstition in the Turkish empire, not among Mohammedans only, but also among Christians; while Lane, in his *Modern Egyptians* (1836), gives an account of the precautions taken by the Egyptians to avoid the influence of evil eye. The American Indians partake of the same belief; and it is not improbable that if the matter were still more profoundly investigated, it would be found that every nation that exists or has existed, with anything like a developed system of superstition, believes or has believed in the reality of fascination in some form or other.

The universality of this superstition goes far to prove that it has what may be called a *natural* origin; and, indeed, when we consider that the *eye* is the most expressive organ of the soul or mind of man, that through it are shot forth, as it were, into the visible world of the senses, the hidden passions, emotions, and desires of our nature, we will not wonder that in the "times of ignorance," when men could give no rational or scientific account of almost any physiological phenomena, if connected with psychology, the eye should have been superstitiously imagined to be a center of malignant influence. The eye is, in point of fact, as potent as superstition dreams: the error lay not in the recognition of its power, but in explaining the mode of its operation. The person who felt himself under the spell of a powerful gaze, was too agitated to calmly consider the cause of his terrors, and attributed to another results for which he himself was mainly responsible. It was really he that gave to the eye of his fellow-creature its baleful influence; and he quailed less before the force of character which it indicated, than before the fearful fancies with which his own timidity had invested it. For this disease, wherever it has existed, or does yet exist, there is no cure but that solid culture of the understanding from which comes a true strength of will and brain. See FASCINATION BY SERPENTS.

EVOLUTE AND INVOLUTE. See CURVATURE and OSCULATING CIRCLE. The evolute of any curve is the locus of the center of its osculating circle, and, relative to its evolute, the curve is called the involute. This is the simplest definition that can be given of an evolute and involute, which are relative terms. There is another, however, which may represent the relation of the curves more clearly to those who are not

mathematicians. If on any curve a string be closely wrapped, and if the string be fastened at one of its ends, and free at the other; and then if we unwind the string from the curve, keeping it constantly stretched, the curve which would be traced out by a pencil fixed to the free end of the string, is called the involute of that from which the string is unwound, and relative to it, the latter is called the evolute. It is clear that the involute might otherwise be described by fastening a string at one extremity of the evolute, and wrapping it thereupon, keeping it always stretched. From either definition, it is clear that a normal to the invo-



lute at any point is a tangent to the evolute, and that the difference in length between any two radii of curvature to the involute is equal to the length of the arc of the evolute intercepted between them. The nature of evolutes was first considered by Huyghens, who showed that the evolute to a common cycloid is another equal cycloid, a property of that curve which he employed in making a pendulum vibrate in a cycloid. To describe the involute of a circle, proceed as follows: Let *a* be the center of the circle, and *b* the extremity of the string to be unwound from its circumference. Divide the circle, or part of the circle, according to the length of curve required, into any number of equal parts, as *c, d, e*, etc.; through these, from *a* draw radial lines; from

the points where these touch the circle, draw, at right angles to the lines *ac*, *ad*, etc., other lines, as in the diagram. With the distance *cb* as radius, from the point *c*, describe an arc *b1*, cutting the line *c1* in 1. From the point *d*, with *d1*, describe an arc 1 2, cutting the line *d2* in 2. From *e*, with *e2*, describe an arc 2 3, cutting the line *e3* in 3. With radius *f3*, from *f*, describe an arc 3 4, cutting *f4* in the point 4. Proceed in this way, describing arcs which pass through the points 5, 6, 7, 8, and 9. The involute will thus be formed.

EVOLUTION. See SPECIES.

EVOLUTION AND INVOLUTION, algebraical terms, the former signifying the *extraction of roots*, and the latter the *raising to powers*. When any number is multiplied by itself, the product is called its square, or second power. If we multiply the square by the number again, we get the cube, or third power; and so on. This process is called involution. Evolution is the inverse process, by which a number being presented, we may ascertain a particular *root* of it, say the fourth; or that number which, being multiplied into unity a particular number of times, say four times, the product will be the number presented. Both subjects will be found treated in all algebraical text-books. Evolution is more particularly considered under the head **EXTRACTION OF ROOTS**.

EVOLUTIONS, in military matters, are the movements of troops in order to change position. The object may be to maintain or sustain a post, to occupy a new post, to improve an attack, or to improve a defense. All such movements as marching, counter-marching, route-marching, changing front, forming line, facing, wheeling, making column or line, making echelon or square, defiling, deploying, etc., come under the general heading of evolutions. More minute descriptions of these and other motions will be given under **TACTICS, MILITARY AND NAVAL**. Other things being equal, the best E. are those which occupy least time and least space. The word evolution equally applies to the movement of ships in a fleet.

EVORA (ancient *Ebora*), a city of Portugal, capital of the province of Alemtejo, and, after Coimbra, and perhaps Thomar, the most interesting city in the country, is beautifully situated on a fertile and elevated plain, 48 m. w.s.w. of Badajoz, and about 80 m. e. of Lisbon. It was once a place of considerable strength; but its ramparts, and the towers which flanked them, its citadel, its forts, and its watch-towers, are now in a hopelessly ruinous condition. The town itself is not well built, its streets are narrow and winding, and its houses old and badly planned. It has a cathedral, a large Gothic edifice, founded in 1186, the choir of which, rebuilt in 1721, is in the Italian style, and is richly adorned with marbles of various colors. E. has been the see of an archbishop since 1541; has an archiepiscopal library, containing upwards of 50,000 volumes; and several pictures of great merit, attributed to Gran Vasco. It has manufactures of ironware and leather, and a well-attended annual fair. Pop. '90, 15,134.

E. is a very ancient city. Quintus Sertorius took it in 80 B.C. It was also conquered by the Moors in 712, but recovered from them in 1166. The Roman antiquities of E. are unrivaled in the peninsula. Among these, the temple of Diana, used as a slaughter-house for some time previous to the year 1834, exhibits in its fine Corinthian columns admirable proportion and delicacy of sculpture. There is also an aqueduct, 1200 paces in length, erected by Quintus Sertorius; but the most beautiful Roman relic, and one of the most perfect pieces of ancient architecture in existence, is the tower which rises in the city at the extremity of the aqueduct. It is 12 ft. 6 in. in diameter, and is surrounded by eight columns of the Ionic order. Ionic pilasters decorate the second story, and the top is crowned with a hemispherical dome. It is wholly constructed of brick, and covered with cement of such a durable nature that, although this delicate structure has existed since 70 B.C., few parts of it seem to have been impaired by time.

EVREMOND, CHARLES MARGOTELLE DE ST. DENIS, SEIGNEUR DE ST. an author and wit of the 17th c., was b. at St. Denis-le-Guast, in Normandy, April 1, 1613. He entered the army about the age of 15, became an ensign in less than a year, and in 1637 had the command of a company of foot. About this time, he gained the favor and friendship of Turenne, Grammont, the prince of Condé, and others of high rank, all of whom were delighted with the wit and cheerfulness of his conversation. Having talked himself into the esteem of these men, it was not long, however, until, by the same means, he brought himself under their displeasure. In 1661 his unbridled indulgence in raillery compelled him to take refuge in England. Many attempts were made at the French court to induce Louis XIV. to recall St. E., whose accomplishments, gayety, and wit, rendered him the delight of all who had not smarted from his sarcasm; but Louis remained immovable until 1689, when he granted the exile permission to return. It was now, however, too late. St. E. had by this time surrounded himself with an admiring circle of the wits and beauties of the English court, and resolved to remain where he was. He died in his 91st year, in Sept., 1703.

St. E.'s works, comprising comedies, classical essays, etc., were first correctly published by Des Maizeaux, with a life of the author (Lond. 1705). The works are also translated into English by the same editor.

EVREUX (anciently *Mediolanum*, and more recently *Ebuorovices*), an episcopal city of France, in the department of Eure, of which it is the capital, is pleasantly situated in

a valley on the Iton, a feeder of the Eure, 60 m. w.n.w. of Paris. It is well built, its streets regular, and the environs prettily laid out in promenades, gardens, and vineyards. The principal building of E. is the cathedral, which dates from the 11th century, and is a composite of various styles of architecture; one of the most interesting features being the north portal built in the 16th century in the flamboyant style. The other buildings of note are the abbey church of St. Thaurin, originally built over the tomb of St. Thaurin, the first bishop of E. and having a shrine executed in the 13th c., which once contained his relics; the bishop's palace, built in 1484; and the *Tour de l'Horloge* of the same century. E. has a variety of manufactures, including cotton and woolen stuffs. Pop. of commune, 16,932.

E. is remarkable for the numerous sieges which it has sustained. It was taken by Clovis from the Romans; was sacked and plundered in 892 by the Northmen, under Rollo; was burned by Henry I. of England in 1119; and in 1194 and 1199 it was twice captured by Philippe Auguste king of France, into whose hands, after a short time, it permanently came. It was frequently taken and recovered in the wars between France and England during the reigns of Henry V. and Henry VI. of the latter country.

VIEL ÈVREUX (*Old Evreux*), a village near E., and the supposed site of the ancient Mediolanum, has some ancient remains of a theater, an aqueduct, and fortifications.

EWALD, GEORG HEINRICH AUGUST VON, one of the greatest orientalists of the 19th c., was b. 16th Nov., 1803, at Göttingen, and exhibited a predilection for oriental literature even in his school-days. He studied at the university of his native place, and while still a student, wrote a work on the composition of Genesis (*Die Composition der Genesis*, Braunsch. 1823). In 1823, he became a teacher at the Wolfenbüttel gymnasium; in 1827, extraordinary, and in 1831, ordinary professor of philosophy at Göttingen; and in 1835, was appointed nominal professor of the oriental languages. Travels in search of oriental MSS. led him, in 1826, 1829, and 1836, to Berlin, Paris, and Italy. After the death of Eichhorn, the critical exegesis of the Old Testament was included in his duties as professor of the oriental tongues. The first, and perhaps the most important fruit of his new labors, was his Critical Grammar of the Hebrew Language (*Kritische Grammatik der Hebr. Sprache*, Leip. 1827), an abridgment of which was published at Leipsic in 1835, under the title of Grammar of the Hebrew Language (*Grammatik der Hebr. Sprache*; 5th edit., 1844); and a still simpler epitome in 1842, entitled Hebrew Grammar for Beginners (*Hebr. Sprachlehre für Anfänger*). Before this, however, E. had acquired a high reputation by his work on Canticles (*Hohe Lied Salomo's*, Gött., 1826); his Commentary on the Apocalypse (*Commentarius in Apocalypsin*, Leip. 1828); his Poetical Books of the Old Testament, in 4 vols. (*Die Poetischen Bücher des Alten Bundes*, Gött. 1835-37); and his Prophets of the Old Testament, in 2 vols. (*Die Propheten des Alten Bundes*, 2 Bde., Stutt., 1840). Between the years 1843-50, E. published an important work, in 4 vols., on the History of the People of Israel until the Time of Christ (*Geschichte des Volkes Israel bis auf Christus*; Eng. trans. 1869-74), and a subsidiary volume on the Antiquities of the People of Israel (*Die Alterthümer des Volkes Israel*). The *Geschichte des Volkes Israel*, together with its two continuations, The History of Christ and his Time (*Geschichte Christus und seiner Zeit*, 1857), and the History of the Apostolic Age, etc. (*Geschichte des Apostolischen Zeitalters bis zur Zerstörung Jerusalems*, 1858), is regarded as E.'s greatest work. But Jewish history and literature did not limit the sphere of E.'s wonderful activity. His lectures at Göttingen embraced the literature of the Arabic, Persian, Aramaic, and Sanscrit tongues, and gave birth to such works as that on the Meters of the Arabian Songs (*De Metris Carminum Arabicorum*, Leip. 1825); on Some of the Older Sanscrit Meters (*Ueber einige ältere Sanscrit Metra*, Gött. 1827), an epitome of the Arabic author Wakidi's work on Mesopotamia (*De Mesopotamiae expugnata Historia*, Gött. 1827), and a Grammar of Arabic, entitled *Grammatica Critica Linguae Arabicae cum brevi Metrorum Doctrina*, 2 Bde. (Leip. 1831-33). In 1832, E. published at Göttingen several very important Dissertations on Oriental and Biblical Literature (*Abhandlungen zur orient. und biblischen Literatur*), and planned the well-known periodical, Journal for the Knowledge of the East (*Zeitschrift für die Kunde des Morgenlands*). E., however, was not only a scholar and philologist, but a man of strong political convictions. Having, along with six of his colleagues (the others were the brothers Grimm, Dahlmann, Gervinus, Weber, and Albrecht), protested against the abolition of constitutional law and liberty in Hanover by the new sovereign, Ernest Augustus (previously duke of Cumberland), he was dismissed from his situation, 12th Dec., 1837, and went to England to investigate its public libraries, whence he was called to Tübingen, in 1838, as professor of theology. Here he remained for ten years, during which he was involved in many strifes. In 1841, he was ennobled by the king of Württemberg. In 1848, E. returned to Göttingen, where he established a Year-book of Biblical Science (*Jahrbuch der biblischen Wissenschaft*), in which, as well as as in his work on the Synoptic Gospels (*Die drei ersten Evangelien*, Gött. 1850), and works on the Epistles of Paul (*Die Sendschreiben des Apostels Paulus übersetzt und erklärt*, Gött. 1857), he strove to give a firmer basis to New Testament criticism and exegesis. E. also paid great attention to Ethiopic literature, a result of which is his valuable Dissertation on the Book of Enoch (*Ueber des Äthiopischen Buches Henoch Entstehung, etc.*, Gött. 1856). Later works were *Das Sendschreiben an die Hebräer und Jacobus' Rundschreiben* (1871); and *Sieben Sendschreiben des Neuen Bundes* (1871). The distinguishing peculiarity of E., as a

theologian and critic, was his love for the concrete forms in which divine truths are revealed in history, and his dislike of the abstractions into which they are refined away by overspeculative theologians. He regarded it as the especial glory of the Jewish people, that they never lost sight of the concrete—as the Persians and Hindus, for example, did, with whom the realities of religion vanished into the most intangible dreams—but kept it ever before them until, in the fullness of times, there was born in their midst Jesus of Nazareth, the Perfect and Only One, in whom humanity reached its spiritual consummation. E. refused to class himself or to be classed with any theological party in Germany. He was equally opposed to the extreme left represented in Tübingen, and to the extreme right represented in the modern Lutheran movement headed by Hengstenberg. When Hanover was, in 1866, incorporated with Prussia, E. declined to take the new oath of allegiance, and was accordingly required to retire from the functions of the professoriate. He returned to political life; and as the three times elected representative of the town of Hanover in the Reichstag, persistently opposed the new political conditions. He d. May 4, 1875.

EWALD, JOHANNES, one of the best lyric poets of Denmark, was b. at Copenhagen on the 18th Nov., 1748, and d. in the same city in 1781. In his 16th year, when his friends were about to send him to the university of Copenhagen, he made his escape to Germany, where he entered as a private soldier in the army of Frederick the Great of Prussia, from which he soon deserted to the Austrians. He induced his friends to purchase his discharge, and returned to Copenhagen in 1760, after having taken part in the great campaigns of 1759–60. The first production of E. which attracted general notice was the funeral ode which he wrote on the death of Frederick V. of Denmark in 1767, and which exhibited so much original genius that it at once raised the young poet to the rank of one of the best writers of his country. In 1770, appeared the prose tragedy of *Rolf Krage*, which gives evidence of a careful study of Shakespeare and the English dramatists of the Elizabethan age. Although *Balder's Deed* (1773), which breathes the heroic spirit of the ancient bards of the north, and exhibits the specially national tendency of E.'s genius, is regarded by some critics as his *chef-d'œuvre*, *Fiskerne*, "The Fisherman" (1780), probably deserves to rank equally high, when considered as a mere lyrical production. His habits of dissipation, and the decided opinions which he expressed in reference to politics, brought him into difficulties of every kind, while his infirmities of temper, and irregularities of conduct, estranged the affection of his nearest relatives, and in the latter years of his unhappy life he was often indebted to the charity of strangers for the means of subsistence. Some of his nautical songs have been raised to the dignity of national odes, and many of his occasional pieces rank among the sweetest poems of his country. He was engaged at the time of his death in compiling an autobiography, and in bringing out the complete edition of his writings, which finally appeared in 1792. His works have also been edited by F. L. Liebenberg (Copen. 1850–55); and a life of E., compiled from hitherto unpublished materials, has recently appeared from the pen of F. C. Olsen, of Copenhagen.

EWBANK, THOMAS, 1792–1870; b. England. He emigrated to New York in his youth, and was appointed commissioner of patents in 1849. He published, besides other works, a *Descriptive and Historical Account of Hydraulic and other Machines, Ancient and Modern*; and *Thoughts on Matter and Force*.

EWELL, BENJAMIN STODDERT, 1810–94; b. District of Columbia; educator; graduated at the U. S. military academy, 1832; assistant professor there, 1832–36; resigned commission, 1836; professor of mathematics and natural philosophy, Hampden-Sydney college, 1839–46, at Washington college, 1846–48, at college of William and Mary, 1848–9; professor of mathematics and natural science at the last college, 1849–61, and president there, 1854–88; and became colonel and adjutant-general in the confederate army.

EWELL, RICHARD STODDERT, 1817–72; b. District of Columbia; graduated at West Point, served on the western frontier, on the coast survey, and in the war with Mexico—being engaged at Vera Cruz, Cerro Gordo, Contreras, Churubusco, Molino del Rey, and Chapultepec; was captain of dragoons in 1849, and was engaged on the Gila and Pinal Apache expeditions. He joined the southern forces in the war of the secession, serving in the Manassas campaign, at Blackburn's Ford and Bull Run, at White Oak Swamp and Cedar Mountain; was defeated at Kettle Run, was in the second battle of Bull Run, and was wounded in the Maryland campaign; became lieut. gen. in 1863, succeeding Stonewall Jackson. He was taken prisoner April 6, 1865, a few days before the close of the war.

EWER, FERDINAND CARTWRIGHT, D.D., 1826–83; b. Nantucket, Mass. graduated at Harvard Coll., 1848; went to California, 1849, and became an editor; but in 1858 entered the Prot. Epis. ministry. He held rectorships in San Francisco and in New York, founding St. Ignatius church in the latter city, 1872. He published *Catholicity in its Relation to Protestantism and Romanism*, 1878; *Grammar of Theology*, 1880, etc. He was a very earnest writer and worker, taking—as in his *Protestantism a Failure*—extreme ground in favor of what has been termed the Romanist re-action in the Prot. Epis. church.

EWING, a co. in n. western S. Dakota, on the Montana border, formed 1883 from part of Harding; 1008 sq. m.; pop. '90, 16.

EWING, FINIS, 1773-1841 ; b. Va. ; one of the fathers of the Cumberland Presbyterian church. He was licensed to preach, and in 1803 was ordained by the Cumberland presbytery. His ordination not being recognized by the Kentucky synod, the presbytery being dissolved, and the action of the synod being sustained by the general assembly, he with two others, in 1810, formed the nucleus of the denomination known as the Cumberland Presbyterian church. In 1820, he removed to Missouri, where he died.

EWING, JULIANA HORATIA ORR (GATTY), 1842-85 ; an English writer ; was the daughter of the Rev. Alfred Scott Gatty and his wife, Margaret Gatty, and was born at Ecclesfield, Yorkshire. Her mother was the author of *Parables from Nature* and other books, and in 1806 started *Aunt Judy's Magazine*, to which her gifted daughter contributed. After the death of Mrs. Gatty, in 1873, Juliana and her sister conducted the magazine for a time. In 1867, Miss Gatty married Major Alexander Ewing, who was himself an author. Miss Gatty's books described child-life, and were professedly written for children, but gained a larger circle of adult readers by their charming and simple style. They include *Mrs. Overthway's Remembrances* ; *Jackanapes* ; *Jan of the Wind-mill* ; *Lob-lie-by-the-Fire* ; *Six to Sixteen* ; *A Flat Iron for a Parthing* ; *We and the World* ; *A Great Emergency* ; *Old-Fashioned Fairy Tales*, and the pathetic *The Story of a Short Life*.

EWING, THOMAS, LL.D., 1789-1871 ; b. Va. ; educated by his own exertions, and admitted to the bar in Lancaster, O., in 1816, soon becoming a prominent and successful lawyer in that state. In 1831, he was sent to the U. S. senate, where he soon became known as opposing the confirmation of Martin Van Buren as minister of England, and President Jackson's measures generally. In 1841 he was appointed by President Harrison secretary of the treasury. Disagreeing with President Tyler (who succeeded Harrison only a month after the latter's inauguration), Ewing, with all the other cabinet officers, except Webster, resigned. Under President Taylor he was the first secretary of the new department of the interior, and when Fillmore succeeded Taylor he was appointed senator from Ohio for the unexpired term of Mr. Corwin, then appointed secretary of the treasury. He retired from public life in 1851.

EWING, THOMAS, JR., b. Ohio, 1829 ; son of Thomas. He was chief-justice of Kansas, and served in the union army during the war of the secession, rising to brevet maj.gen. of volunteers. He was a member of congress, 1878-81, where he was a leading democratic advocate of what are known as "greenback views;" was unsuccessful candidate for governor of Ohio in 1879; and subsequently practiced law in New York. He d. in 1896.

EXAMINATIONS FOR THE PUBLIC SERVICE. See CIVIL SERVICE; CIVIL SERVICE REFORM.

EXANTHEMATA (from a Greek verb, to effloresce, or come out in a rash), a class of febrile diseases (see FEVER) attended by distinctive eruptions on the skin, appearing at a definite period, and running a recognizable course. To this class belong small-pox, chicken-pox, measles, scarlet fever, and, according to some authorities, plague, typhus, erysipelas, etc.

EXARCH was the title first conferred by Justinian on his commander-in-chief and vicegerent in Italy. The conquest of Italy by the Goths in the early part of the 6th c. was a severe blow to the Byzantine pride; and Justinian determined to wipe out the disgrace, and recover the imperial territories. The execution of this project was intrusted at first to Belisarius (q. v.), and afterwards to Narses (q. v.), by whom the reconquest of Italy was effected. The latter was the first who bore the title of E. ; and the district over which he ruled was called the *exarchate*. The seat of the exarchs was Ravenna, the different towns and territories belonging to them being governed by subordinate rulers, styled *duces* or dukes. The extent of the exarchate, however, was gradually diminished, until it embraced only the country about Ravenna, the present Romagna, and the coasts of Rimini as far as Ancona. This was brought about partly by the conquests of the Longobards, partly by the dukes of Venice and Naples making themselves independent. In the year 728, even this small portion fell, for a short time, into the hands of the Longobards. In 752, Astulf, or Astolphus, king of the Longobards, put an end to the Byzantine rule at Ravenna; but in 755, he was compelled to resign the exarchate to Pepin the less, king of the Franks, who gave it over to the bishop of Rome, Stephanus II.—In the Christian church, E. was originally a title of the bishops, afterwards of a bishop who presided over several others—a primate. It was borne by the bishops of Alexandria, Antioch, Ephesus, Cæsarea, and Constantinople, till it was finally exchanged for the title of patriarch. A superior over several monasteries was also called in ancient times an exarch. The same title is also borne, in the modern Greek church, by the person who "visits" officially, as a sort of legate of the patriarch, the clergy and churches in a province.

EXCALIBUR, the famous sword of King Arthur (q. v.), bestowed upon him in accordance with the promise of Merlin by the Lady of the Lake, and at his death thrown by one of his faithful knights back into the waters of the lake, where it was grasped and borne beneath the surface by a mystic hand.

EXCELLENCE, or **EXCELLENCY**, a title now given to ambassadors, as representing not the affairs alone, but the persons of sovereign princes, to whom it was formerly applied. The privilege of being addressed as "your excellency," and of demanding a private interview with the ruler to whom he is accredited, are the chief distinctions between the privileges of an ambassador and an envoy or minister plenipotentiary. In the U. S., the governors of New Hampshire and Massachusetts are legally entitled to be addressed as "Your Excellency": elsewhere the address is by courtesy only.

EX CATHEDRA (Latin, meaning literally, from the chair, *cathedra* being the chair or seat of a person in authority, as of a bishop or lecturer), a phrase originally used with reference to the decisions of the pope or others high in authority, who, literally speaking, pronounced their judgments *ex cathedra*. The expression is now applied to authoritative assertion in general, e.g. to speak *ex cathedra* is to speak as if vested with full authority, without fear of contradiction or opposition. See **CATHEDRAL**.

EXCHANGE, a term applied to buildings or places of resort for merchants. The name *bourse* (purse) is applied in France and Belgium to a resort of this kind; and in Berlin, Hamburg and other German cities there is the equivalent word *börse*. Exchanges have usually comprehended an open quadrangle surrounded by an arcade, free to all persons; but in some cases large reading rooms constitute resorts of this kind, and these are only open to a body of subscribers and visitors whom they introduce. Gathering places for merchants existed at an early date in Venice, Genoa and other Italian cities; but the modern exchange originated in the early part of the 16th century in the commercial cities of the Netherlands and Germany. From the Netherlands they were introduced into England by Sir Thomas Gresham, who, having resided as British agent at Antwerp in 1850, chose the bourse of that city as a model for the royal exchange of London, which was ceremoniously opened by Queen Elizabeth in 1570. Their institution in England is therefore coincident with the rise of commercial prosperity in the middle of the 16th century. The present royal exchange was founded in 1842, and completed in three years at a cost of £150,000. There are many other exchanges in London, but for especial purposes, such as the coin exchange, coal exchange, etc.; and in recent years there have been numerous additions to the list of exchanges in the large towns of England and Scotland. See **STOCK EXCHANGE**.

Of the exchanges in the United States, the most noteworthy, from an architectural point of view, is the Merchant's Exchange of New York, on Broad St., near Wall. It was founded in 1817, and the first building, on Wall between Pearl and William Sts., was completed in 1827. This being destroyed by fire in 1835, a new building was erected on the old site, but afterwards sold to the government to be used for a custom house. In most of the important cities of the United States there are exchange buildings, generally of large size. Other celebrated exchanges are the bourse of Paris, opened in 1824, and that of Hamburg. The latter is a general exchange in which the different branches of business are represented by separate departments and bureaux. It has among its attractive features, a library of over 50,000 volumes, and is one of the principal objects of interest in the city to the traveller. The exchanges of St. Petersburg and Amsterdam are also buildings of great size and beauty.

The term exchange seems to have been naturally adapted from the circumstance that the buying and exchanging of merchandise and also the exchanging and paying away of money formed the chief object of concourse. The vast number of transactions and the increasing complexity of our commercial system have intensified the tendency to form associations of this character for the purpose of procuring uniformity, promoting fair dealing, and settling disputes without recourse to litigation, until they have become most conspicuous and necessary factors in the modern business world. Thus there is a stockbroker's exchange, where the validity of investments is carefully investigated and the value of new securities subjected to the most searching examination before they are admitted to be bought and sold upon exchange, thereby insuring to a great extent the certainty and security of business transactions; a produce exchange, which investigates the staple food products, prevents adulteration, adopts marks or brands whereby the goods are known in all the markets of the world, establishes grades according to quality, and takes note of the different methods of preparation for exporting; and cotton exchanges, serving similar purposes in places where this staple is extensively purchased and sold. Exchanges have been established for almost every important class of commodities; but instances are not wanting, as in the case of the Hamburg exchange, already mentioned, where many different kinds of business are represented by departments devoted to their respective requirements. A numerous and important class of exchanges in the United States is the mechanic's exchange. This, as well as the real-estate exchange, is found in almost every considerable town.

EXCHANGE, in political economy, refers to the exchange of wealth. The classical school of economists divided the science into four departments, that is, production, exchange, distribution, and consumption. In accordance with this division, the department of exchange has to do with the phenomena of value in all its phases, the interaction of supply and demand, the laws of price and of credit, and all matters affecting the circulating medium. Later writers have discarded the division of political economy by these hard and fast lines, recognizing the difficulty of classifying all economic phenomena under one or another of these heads. Exchange arises from the division of labor. In the earlier stages of society, when the individual produced all that was necessary for his own support, there was no need of exchange. The next stage was that of

barter, by which a man secured what he wished by giving for it some commodity that he himself had produced. This clumsy system sufficed for the needs of the primitive man, but became utterly inadequate as trade expanded and society grew more complex. It depended upon what has been called the double coincidence of wants, namely that the would-be purchaser should be able to find a would-be seller having the article which the former desired and desiring the article which the former possessed, and that each possessed the articles in question in exchangeable quantities. Hence arose the need of a medium of exchange to serve as a measure or common standard of value. As the division of labor renders exchange necessary, so it is itself promoted by every advance in exchange. In other words, the exchange of commodities and the division of labor are mutually dependent. The importance of exchange is so great that some economists have favored changing the name of their science from political economy, or economics, to the science of exchange, for political economy concerns itself exclusively with the laws of wealth, and wealth is inconceivable apart from exchange. The ratio in which commodities exchange for each other determines value, and the value of an article, expressed in terms of some one commodity, is called price. The question whether anything that cannot be exchanged may still be wealth, has given rise to long controversy. One class of writers would include under the term wealth such abstractions as personal honesty, intelligence, and skill, since these qualities, when embodied in a workingman, enable him to command a higher price for his services. Others would rigidly exclude from the list of items to be classified under wealth, all things which are incapable of being detached from the person or the possessor. See the articles **VALUE, DEMAND AND SUPPLY, MONEY, and POLITICAL ECONOMY.**

EXCHANGE is applied in a special and technical sense to the conversion of the money of one country into its equivalent in the money of another. The technical meaning of the word has now, however, come to be the difference between the actual value of money taken by the standard of bullion, in any two places with relation to each other. If in New York it requires more than \$500 to pay a debt of that amount in London, the rate of exchange is against the former town and in favor of the latter, an inhabitant of which can pay a debt of \$500 in New York with less than that amount of bullion in London.

The operations of exchange are based on the principle of the cancellation of indebtedness, and can be best explained by simple example. If a New York merchant, A, buys goods worth 1000 ounces of gold for a London merchant, B, and seeks to discharge his indebtedness without having recourse to the cumbrous expedient of exporting specie, he endeavors to find some one who, having gold or a right to demand gold to that amount in London, is willing to transfer his claim for the amount thereof, or for so much more or less as the rate of exchange is for or against the latter city. A purchases the credit of this third party, C, and sends an order demanding its payment to his creditor, B, who thus in turn becomes the creditor of another London merchant. Now the amount that A will have to pay C for the value of the 1000 ounces of gold in London will depend upon the par of exchange. If exchange is at par between the two places, a certain amount of money metal in the one place will command an exactly equal amount of the same metal in the other, and in the above case A would have to pay C the equivalent of the 1000 ounces in gold; but if exchange is above or below par, in the one case a larger, and in the other a smaller amount of the money metal would be required in the place where the claim is purchased. If the debt, or any part of it, cannot be met by such an adjustment out of cross debts and credits, it will be necessary for the debtor to send bullion to his creditor; and this, being an expensive process, throws the rate of exchange against the debtor who so pays. For instance, if C's claim in London amounted to only 500 ounces of gold, then A would have had to be at the expense of sending the balance to London. No such actual transactions take place in the existing mercantile world, because the accounts in debtor and creditor connected with the town referred to are to be counted in thousands, and ramify into other towns; but the above example may be held to represent groups of debtors and creditors, as algebraic signs represent quantities. The individual merchants in one trading town have no idea how the surplus of debt or credit may be between them; far less can they tell how it may be adjusted by debts and credits in other towns; but through the agency of bankers, bill-discounters, and other persons who deal in money, the relations of all trading-places toward each other are in a constant state of shifting and adjustment; and any one who has to pay a debt in any trading-place can find out how much he has to give to get that debt paid, and can pay it accordingly. When, through the operation of these complicated transactions, you require to give more than \$500 in New York to get that amount paid in London, then the rate of exchange is against New York and in favor of London, where less than \$500 in cash will pay a debt of \$500 in New York. The difference will generally depend on the difficulty of adjusting questions of debt and credit throughout the commercial world, in such a manner as to get the debt paid. If it cannot be paid by adjustment, then bullion must be sent; and thus it is generally said, that the rate of exchange against any place is limited by the charge of exporting bullion. The rate of exchange is liable to be brought to a level also by commercial exportation and importation, since, whenever it is expensive to get money sent to a country, there is a temptation to send goods to that country to compensate the debt. In the general circle of transactions of this kind, the state or town which has the largest amount of transactions will have the largest number of debtors and of creditors, and will afford the chief facility for each compensating the other.

It is thus that London is the centre of the money market, where all the debits and credits of the world may be said to meet and extinguish each other. Exchange is at par between two places when the debts due from the one to the other within a given time exactly balance, and there is an equal demand in each for bills of exchange upon the other. If, however, the merchants of one place, say New York, are required within a given time to make a greater sum of payments to the merchants of another place, say London, than the latter have to make in New York, then exchange on London will be above par in New York. While the old notions about the balance of trade (q.v.) existed, it was supposed that the nation which the exchange was against was going to ruin; while that which it was in favor of was prospering through the other's loss. At present it is inconvenient and expensive to a country to have the exchange against it. An adverse exchange generally indicates a sort of break in the circle of trade which it would be advantageous to fill up, and *may* be caused by the commerce of a country decreasing; on the other hand, however, the imports for which a country pays in cash or in expensive bills, may be the same as a highly advantageous traffic. Gold-producing countries find bullion their most advantageous export, and the same is the case with countries into which gold has flowed in excess.

EXCHEQUER, CHANCELLOR OF THE. The office of chancellor of the exchequer, in Great Britain will be accurately described when we say that he is the first finance minister of the crown. Strictly speaking, he is the under-treasurer, the office of lord high treasurer being now vested in the lords commissioners of the treasury. When the prime minister is a member of the house of commons, he sometimes holds the office of chancellor of the exchequer. The judicial functions of the chancellor of the exchequer may now be considered matter of history. See **EXCHEQUER, COURT OF**. When the chief baron and the barons are equally divided in opinion, he may be required to rehear the cause with the barons, and to give his opinion. But the last instance in which this was done was in 1735; and though the decision which sir Robert Walpole gave is said to have given great satisfaction, the custom is not likely to be reverted to.

EXCHEQUER, COURT OF, which was abolished as a separate court by the Judicature Act of 1873, and its jurisdiction transferred to the new High Court of Justice, was the court wherein matters relating to the royal revenues were adjudicated upon. It is said (Madox, *Hist. of Ex.*) to have existed from the early times of the Conquest, and was denominated *scaccarium*, from *scaccus* or *scaccum*, a chessboard, from the fact that a chequered cloth was wont to be laid upon the table of the court; but under the Norman kings it was probably nothing more than a branch of the *Aula Regia*, or great council of the nation. From the reign of Henry III. its existence as a separate court was recognized. Its special business was, as before, the decision of revenue cases, but from an early period the lawyers showed a tendency to extend its jurisdiction over the ordinary litigious business—the common pleas—of the country. This was done by establishing the fiction that all lieges were the crown's debtors, whereby the court of exchequer acquired a concurrent jurisdiction with the other courts of common law. Besides its common law of jurisdiction, the Exchequer was distinguished from the King's Bench and Court of Common Pleas by having an equity side, but this was abolished in 1841, and its equitable jurisdiction transferred to the court of chancery. The judges of the exchequer consisted originally of the lord treasurer, the chancellor of the exchequer, and three puisne judges; these last were called barons of the exchequer. The chancellor of the exchequer sat only on the equity side of the court; he has not been called upon to exercise his judicial functions since 1735. The division of the high court, which still retains exclusive jurisdiction of the original court of exchequer, had, 1873–81, six judges—viz., the chief baron, and four barons of exchequer. From this division the appeal was to the court of appeal.

The court of *exchequer chamber* was formerly a court of all the judges in England assembled for decision of matters of law (Coke, *Inst. IV.*, 110, 119). Originally established in the reign of Edward III., for the purpose of reviewing the decisions of the common law side of the court of exchequer, it developed into a general court of error, in which capacity it revised the judgments of the other two courts of common law as well. In the reign of Elizabeth it was enacted that the judges of the common pleas and exchequer should form a second court of exchequer chamber, for review of certain cases in the queen's bench. But this intermediate court of appeal was abolished by the Judicature Act of 1873, as inconveniently composed, and somewhat unnecessary. An appeal now lies from each division of the high court of justice in England direct to the court of appeal, which succeeded to the jurisdiction formerly vested in the house of lords, as the supreme court of appeal, and consists of the lord chancellor, and the chiefs of the divisions, and the judges of the privy council.

In Scotland, before the union, the exchequer was the king's revenue court. A new court was established in the reign of queen Anne having a privative jurisdiction as to questions relating to revenues and customs of excise, and as to all honors and estates real and personal, and forfeitures and penalties arising to the crown within Scotland. But questions of *title* to honors, lands, etc., were reserved to the court of session. The judges of the court were the high treasurer of Great Britain, the chief baron and four other barons; and English barristers as well as Scotch advocates were allowed to practise in the court. By a statute of William IV, it was provided that successors should not

be appointed to such of the barons as should retire or die, and that the duties of the court should be discharged by a judge of the court of session. And now, by 19 and 20 Victoria, c. 56, the court of exchequer is abolished and the jurisdiction transferred entirely to the court of session.

The court of *exchequer chamber* in Ireland was established by 40 George III., c. 39, but was abolished as an intermediate court of appeal between the Irish courts and the high court in England.

EXCHEQUER BILLS, bills issued at the exchequer under the authority of acts of parliament, as security for money advanced to the government. They contain an engagement on the part of the government for the payment of the principal sums advanced with interest. These bills form the chief part of the unfunded debt of the country. They were first issued in the reign of William III., in the year 1696, and were drawn for various amounts from £100 to £5. At that time they bore interest at the rate of 3*d.* per day on £100 (Macaulay's *History of England*, iv. 700). The interest was reduced to 2*d.* during the reign of Anne. During the war 1793-1814, the rate of interest was usually 3½*d.* At present, it is generally from 1½*d.* to 2½*d.* per £100 per diem. Holders of these bills are exempt from all risk, except that arising from the amount of premium or discount they may have given for them. The bills pass from hand to hand as money, and are payable at the treasury at par. They may also be paid to government in discharge for taxes. When it is intended to pay off outstanding exchequer bills, public notice is given by advertisement. The advances of money to the government by the bank of England are made on exchequer bills. These bills are a convenient means whereby the government can meet a sudden demand for unusual expenditure. The amount of exchequer bills unprovided for in 1880-81 was £5,162,800. Another portion of the unfunded debt is constituted by exchequer bonds, with fixed rates of interest for definite periods.

EXCHEQUER TALLIES, seasoned wands of ash, hazel, or willow, formerly used for checking accounts in the English exchequer. The sum acknowledged was inscribed on the tally, on the other side of which the same sum was inscribed in Roman characters, together with the payer's name. Notches marked upon the tally indicated by their form the class to which the account belonged. This tally was split, and the payer received one half, which he presented for payment, and which was first matched with the half remaining in the office. It is said that this rude device, which was retained till 1783, was a very perfect protection against fraudulent claims.

EXCIPIENT (Lat. *excipio*, I receive), an inert or slightly active substance, introduced into a medical prescription as a *vehicle*, or medium of administration for the strictly medicinal ingredients. Thus conserve of red roses, or bread-crumbs, is used to make up pills; sulphate of potash, or white sugar, in medicinal powders; water, mucilage, white of egg, and many other substances in fluid mixtures.

EXCISE, the name of a tax on commodities, from the Latin *excisus*, cut off, as being a portion of the value of the commodity cut off and set apart for the revenue before the commodity is sold. This is not its actual nature, however, for the manufacturer, who looks for a profit on his outlay, does not give part of the value to the revenue; he merely counts the tax as part of his expenditure, which he intends to get back with a profit, so that it constitutes an addition to the ultimate price which the purchaser or consumer has to pay. A tax on commodities bought and sold is a very obvious one, but it has generally appeared in the simple shape of a toll on goods brought to market, and the complicated arrangements for officially watching the process of a manufacture for the purpose of seeing that none of the dues of the revenue are evaded is of comparatively modern origin. Though a tax corresponding to our excise appears to have been occasionally levied in very early times, it was first introduced under that name into England by the Long Parliament, who established an excise on liquors in 1643, with the promise of repeal at the end of the war, but when the land tax was removed or greatly diminished, and revenue from that source was no longer sufficient, it was found impossible to dispense with this new method of supply to the treasury. Though always unpopular, the excise in some form or other has ever since continued to be a material element in the taxation and revenue of Britain.

In the earlier part of the last century, sir Robert Walpole entertained the notion of enlarging its productiveness, while mitigating its proportional pressure by the bonding system, which suspends the exaction of the duty until the goods are sold, and thus leaves the manufacturer all his capital to be devoted to production. His plan involved the ultimate extension of the excise until it should virtually become the sole source of revenue, in the hope that by diminishing the number of taxes, greater simplicity and economy would be secured in their collection, while the substitution of an import on domestic commodities for the customs would destroy smuggling, introduce an error of free trade, and render England a vast free port for the world's commerce. But the rumor of an enlargement of the unpopular excise duty created a general excitement, and the memorable cry of "Liberty, Property, and no Excise," compelled Walpole to abandon the project. The great wars in the reigns of George II. and George III. having necessitated a further extension of the excise and an increase of its rate, it grew more productive from decade to decade, and from 1780 to 1825 its returns generally exceeded those of the customs. In the mean time, the diminution of the land tax still

continued. The reform of the excise began in 1822, and several articles were placed on the free list in that year and in the succeeding period, but this movement ceased in 1836, and no further reductions were made until the matter was again taken up under the leadership of sir Robert Peel, and a course of gradual reduction of the rates was entered upon, while many commodities previously taxed were relieved from the excise. Notwithstanding this reduction, the revenue from the excise rose rapidly, thus braving out the rule that a reasonable reduction of high taxes upon consumption increases the revenue. The only excisable articles in Great Britain at the present time are spirits, beer, tobacco, chicory, and the passenger receipts of railway companies.

Some account of the working of the tax in England has been necessary from the fact that the excise system in the United States is based upon the English system, the colonies having largely copied the legislation of the mother country in this particular, and having inherited the dislike of the excise in any form. Nevertheless, Pennsylvania, Massachusetts, and Connecticut were forced to an early imposition of a tax on spirits. But great reluctance was manifested to the granting of this power to the federal government, and we find several states in 1790 trying, through their representatives in the first congress, to procure the passage of an amendment to the constitution forbidding the general government ever to resort to this form of tax. Secretary Hamilton, however, insisted on the necessity of an excise on spirits, of which the consumption was excessive, and a tax was finally imposed, varying from nine to twenty-five cents per gallon on spirits distilled from articles produced in this country. The rates were somewhat reduced in 1792, but subsequently the tax was extended to other articles, refined sugar, snuff, and auction sales being included in the list, and stamp duties imposed on various instruments of exchange. The opposition finally culminated in the Whiskey Insurrection (q.v.) in Pennsylvania, and when Jefferson became president he proposed the abolition of the entire system, the revenue from the customs having rapidly increased. Congress fell in with his views, and the tax was removed, not to be restored until the necessities of the War of 1812 led to the passage of an act levying certain taxes which were afterward repealed in 1817, and no excise was imposed till the war of the secession. Our present system dates from July 1, 1862, a variety of taxes being needed to meet the exigencies of war times, but when the pressure was removed after the war the list of taxable articles was rapidly curtailed, until almost the entire revenue was raised from the excise on spirits and tobacco. These, in 1875, yielded 89 per cent. of the total produce of the internal revenue system, and they still continue to constitute far the most productive source of our revenue. It has seemed to be the policy of the United States to employ the excise system in its widest extent only in time of war, and as soon as the financial strain is removed, to recur to an excise upon luxuries alone. This may be ascribed partly to the inherent dislike of the tax itself and partly to the desire of the protectionists for a revenue derived solely from duties on imported goods. All other nations obtain part, and some a large part, of their revenue from an excise. At the present time, in the United States, the articles upon which the excise is levied are alcoholic liquors, tobacco, oleomargarine, and the circulation of Banks. In 1895 the excise on spirits yielded \$79,862,627; tobacco, \$29,707,908; fermented liquors, \$31,640,618; oleomargarine, \$1,960,794; banks, 1,704,007. In 1896 the total ordinary revenue was \$409,475,409. Previous to 1864 the receipts from the internal revenue system were uniformly less than the customs, but in that year the former amounted to \$109,741,134, while the customs yielded \$102,316,153, and the internal taxes continued to supply the larger portion of the revenue till 1874, when their receipts fell to \$102,409,785, the customs amounting to \$163,103,834 in the same year. Since that time the customs have always been in excess. In 1890 the customs produced \$229,668,585; the internal revenue taxes but \$142,606,706; but from 1890 to 1896 the difference in their productiveness was not so great, revenue from customs in 1896 being \$160,021,752, and from the excise \$146,762,865.

An excise, when compared with other taxes, has its good and its bad features; it is a method of extracting money for national purposes as expenditures on luxuries, and is especially serviceable when fed from those luxuries the use of which in excess becomes a vice. On the other hand, it renders necessary a system of inquisitorial inspection not only very offensive to all free people, but very open to abuse and fraud, while the manufacturer is at times obliged to employ a more expensive and inconvenient process and to forego the introduction of improvements in order to conform to governmental regulations, the cost of such unnecessary labor falling eventually upon the consumer. Moreover, checking the demand by artificially raising the price of a commodity in this way may often retard the growth of a rising industry. Though counteracted in a measure by the bonding system, the necessity of a larger capital for the manufacture of excisable articles fosters a sort of monopoly by its tendency to check competition; and since the manufacturer must realize profits on that part of his capital which is applied to the payment of taxes, as well as what is directly employed in the production of the article, the price to the consumer is greatly increased. These objections do not, however, invalidate the advantages of the excise system in this country, where the luxuries, spirits and tobacco, bear the chief burden of the tax; and it is the common opinion that a low excise on articles of luxury is the most productive as well as the least objectionable of taxes. See FINANCE; STAMP ACT; STAMPS; TAX.

EXCITANTS, or **STIMULANTS**, are those pharmaceutical preparations which, acting through the nervous system, tend to increase the action of the heart and other organs. They all possess more or less of a pungent and acrid taste, and give rise to a sensation of warmth when placed on a tender part of the skin. The class is a very numerous one, and the application of excitants or stimulants to the human subject should always be under the supervision of a qualified medical practitioner.

EXCITO-MOTOR ACTION. See **NERVOUS SYSTEM**.

EXCLUSION BILL, a proposed measure for excluding the duke of York, afterwards James II., from the succession to the throne, on account of his avowed Catholicism. A bill to this effect passed the commons in 1679, but was thrown out by the upper house. As the new parliament summoned in 1681 seemed determined to revert to this measure, it was dissolved, and Charles ruled henceforth without control. See **CHARLES II.**, **JAMES II.**

EXCOMMUNICATION is exclusion from the fellowship of the Christian church. The ancient Romans had something analogous in the exclusion of persons from the temples and from participation of the sacrifices, which persons were also given over with awful ceremonies to the furies. The Mosaic law decreed E. in case of certain offenses; and the intimate connection of things civil and ecclesiastical under the Jewish polity, rendered it terrible even as a temporal punishment. The Jews, in practice, had three degrees of excommunication. The first, *niddui*, was an exclusion from the synagogue for thirty days, that the offender might be ashamed. The second, *cherem*, was also for thirty days, but, besides exclusion from the synagogue, carried with it a prohibition to all other Jews of any intercourse with the individual, and was often proclaimed with sound of trumpet. The third, *shammatha* or *anathema maranatha* (see 1 Cor. xvi. 22), was exclusion from the synagogue and privileges of the Jewish church for life, with loss of civil rights, and was accompanied with terrible curses, in which the offender was given over to the judgment of God. In the Christian church, E. has in all ages been practiced, as indeed every society must necessarily have the power of excluding unworthy members and those who refuse to comply with its rules, and the New Testament plainly recognizes and establishes this right in the church. But two different degrees of E. were soon distinguished—the first or lesser, a mere exclusion from the Lord's table and from other privileges of members of the church; the second or greater, pronounced upon obstinate offenders and persons who departed from orthodox doctrine, more solemn and awful, and not so easily capable of being revoked. Penances and public professions of repentance were required; and in Africa and Spain, the absolution of *lapsed* persons (i.e., those who in time of persecution had yielded to the force of temptation, and fallen away from their Christian profession by the crime of actual sacrifice to idols) was forbidden, except at the hour of death, or in cases where martyrs interceded for them. But for a long time, no civil consequences were connected with excommunication. Afterwards, the greater E. was accompanied with loss of political rights, and exclusion from public offices. The power of E. also, which had been at first in the church as a body, gradually passed into the hands of the bishops, and more especially of the popes, who did not scruple to exercise it against entire communities at once. The *capitularies* of Pepin the Less, in the 8th c., ordained that the greater E. should be followed by banishment from the country. The Roman Catholic church pronounces the sentence of E. with many circumstances of terrible solemnity, and it contains a prohibition to all Christian persons of all intercourse with the person excommunicated, and of extending to him even the most ordinary social offices. The latest "examples" made by the pope were Napoleon I. in 1809, and Victor Emmanuel, king of Italy, in 1860; neither of whom, however, was excommunicated by name, the pope having confined himself to a solemn and reiterated publication of the penalties decreed by his predecessors against those who unjustly invaded the territories of the holy see, usurped or violated its rights, or violently impeded their free exercise. Pope Innocent III., in the Lateran council (1215), declared that E. put an end to all civil rights and dignities, and to the possession of any property. The E. of a sovereign was regarded as freeing subjects from their allegiance, and in the year 1102, this sentence was pronounced against the emperor Henry IV., an example which subsequent popes likewise ventured to follow. But the fearful weapons with which the popes armed themselves in this power of E., were rendered much less effective through their incautious employment, the evident worldly motives by which it was sometimes governed, and the excommunications which rival popes hurled against each other during the time of the great papal schism. The Greek church also makes use of E., and every year at Constantinople, on a certain Sunday, the greater ban is pronounced against the Roman Catholic church.—The reformers retained only that power of E. which appeared to them to be inherent in the constitution of the Christian society, and to be sanctioned by the word of God; nor have any civil consequences been generally connected with it in Protestant countries. To connect such consequences with E. in any measure whatever, is certainly inconsistent with the principles of the reformation. Nevertheless, in England, until the 53d of Geo. III. c. 127, and in Ireland, until the 54th, c. 68, persons excommunicated were debarred from bringing or maintaining actions, from serving as jurymen, from appearing as witnesses in any cause, and from practicing as attorneys in any of the courts of the realm. All these disabili-

ties were removed by the statutes above named; and the excommunicated were declared no longer liable to any penalty, except "such imprisonment, not exceeding six months, as the court pronouncing or declaring such person excommunicate shall direct."

In the Roman Catholic church, the power of excommunicating is held to reside, not in the congregation, but in the bishop; and this is believed to be in exact accordance with the remarkable proceeding commemorated in the First Epistle of St. Paul to the Corinthians (1 Cor. v. 3-5), and with all the earliest recorded examples of its exercise. Like all the other powers of the episcopate, it is held to belong, in an especial and eminent degree, to the Roman bishop as primate of the church; but it is by no means believed to belong to him exclusively, nor has such exclusive right ever been claimed by the bishops of Rome. On the contrary, bishops within their sees, archbishops while exercising visitatorial jurisdiction, heads of religious orders within their own communities, all possess the power to issue E., not only by the ancient law of the church, but also by the most modern discipline. As to the prohibition of intercourse with the excommunicated, a wide distinction is made between those who are called "tolerated" and those who are "not tolerated." Only in the case of the latter (a case extremely rare, and confined to heresiarchs, and other signal offenders against the faith or public order of the church) is the ancient and scriptural prohibition of intercourse enforced. With the "tolerated," since the celebrated decree of Pope Martin V. in the council of Constance, the faithful are permitted to maintain the ordinary intercourse. It is a mistake, likewise, to ascribe to Catholics the doctrine "that excommunication may be pronounced against the dead." The contrary is expressly laid down by all canonists (Liguori, *Theologia Moralis*, lib. vii. n. 13, 1). In the cases in which this is said to have been done, the supposed "excommunication of the dead" was merely a declaration that the deceased individual had, *while living*, been guilty of some crime to which *excommunication is attached by the church laws*. Catholic writers, moreover, explain that the civil effects of E. in the mediæval period—such as incapacity to exercise political rights, and even forfeiture of the allegiance of subjects—were annexed thereunto by the civil law itself, or at least by a common international understanding in that age. Examples are alleged in the law of Spain, as laid down in the sixth council of Toledo—a mixed civil and ecclesiastical congress—(638); in the law of France, as admitted by Charles le Chauve (859); in the Saxon and in the Swabian codes, and even in the English laws of Edward the Confessor; all which, and many similar laws, proceed on the great general principle of these mediæval monarchies, viz., that orthodoxy and communion with the holy see were a necessary condition of the tenure of supreme civil power; just as by the 1 Will. and Mary, s. 2, c. 2, profession of Protestantism is made the condition of succession to the throne of England. Hence, it is argued, the mediæval popes, in excommunicating sovereigns and declaring their subjects released from allegiance, did but declare what was, by the public law of the period, the *civil* effect of the exercise of what in them was a *spiritual* authority.

By the discipline of the Roman Catholic church, kings or queens, and their children, are not included in any general sentence of E., unless they be specially named.

EXCRETION. See SECRETION.

EXE, a river of the s.w. of England, rises in Exmoor, in the w. of Somersetshire, and flows 19 m. s.e. to the borders of Devonshire, and then 35 m. s. through the e. part of that co. into the English Channel at Exmouth.

EXECUTION, CRIMINAL. See CAPITAL PUNISHMENT.

EXECUTION, MILITARY AND NAVAL, usually takes place by hanging or shooting, according to the rank of the offender and the nature of the offense. In some rare instances, blowing from the mouth of a gun has been resorted to. For particulars of the acts for which death is awarded, see PUNISHMENTS, MILITARY AND NAVAL, and MUTINY ACT.

EXECUTION ON CIVIL PROCESS is the method whereby the English high court enforces its judgment on the person or estate of those against whom judgment has been given.

In the United States execution is the writ which directs and authorizes the officer to carry into effect the final judgment or decree of a court upon the person or estate against whom judgment has been given. It is usually, though not always, a writ for the recovery of money for debt or damages out of the estate of a defendant. Sometimes it is a writ for a defendant upon a judgment in replevin, for a return of goods with damages; and sometimes a writ for the recovery of costs only. An execution on civil process may be taken out as soon as judgment is pronounced, even before it is recorded. The execution, unless otherwise specially provided by statute, or unless a writ of error or some agreement of the parties be interposed, must be taken out within a year and a day from the time the judgment was signed. After that time execution cannot issue unless a *fieri facias*, or *capias ad satisfaciendum*, was previously sued out. The writ is directed to the sheriff, or in case of his disqualification by interest or otherwise, to the coroner, who becomes responsible for its execution, and is liable for damages if he neglect his duty. He is authorized to sell the personal property of the defendant at auction, and apply the proceeds to the satisfaction of the judgment and the costs and charges of the proceedings; and if there be a surplus, it must be paid to the defendant. In general, lands are not subject to execution; but, after a levy has

been made under the *fiery facias*, they must be appraised by the sheriff's jury and delivered to the plaintiff at the valuation until the debt is paid out of the profits. Exemption is made of certain property from execution for debt, as, for instance, household furniture, necessary provisions and fuel for the use of the family, necessary wearing apparel, bedding, tools of trade, books, pictures, etc., and a homestead of a certain value. The laws of the several states in respect to such exemptions are not uniform in all particulars.

EXECUTION OF CRIMINALS. See CAPITAL PUNISHMENT. Executions took place publicly in the United Kingdom till 1860, when it was by an act of parliament made law that all executions should take place within the precincts of a prison, in the sight of certain officials, newspaper reporters, and others invited to be present. The United States, Bavaria, and the colony of Victoria had previously adopted this method. The lack of that terror with which public executions were supposed to strike the multitude is, by this private mode of procedure, held to be more than compensated by the prevention of what was a brutalizing public spectacle. In London, executions took place for the most part at Tyburn until 1783, when a scaffold erected in front of Newgate prison became the common place of execution. "The gallows was built with three cross-beams for as many rows of sufferers; and between Feb. and Dec., 1785, ninety-six persons suffered by the 'new drop,' substituted for the cart. About 1786, here was the last execution, followed by burning the body; when a woman was hung on a low gibbet, and life being extinct, fagots were piled around her and over her head, fire was set to the pile, and the corpse burned to ashes. On one occasion the old mode of execution was renewed: a triangular gallows was set up in the road opposite Green-Arbor court, and the cart was drawn from under the criminal's feet."—*Timbs' Curiosities of London*. To render executions more impressive, they were in some cases ordered to take place near the scene of guilt. About forty years ago, two men were hanged at Bishopbriggs, near Glasgow, in sight of the scene of a murder they had committed. The ordinary place of execution in most towns in Great Britain and Ireland is outside the prison. At Edinburgh, executions took place chiefly in the Grassmarket, until 1784, when they were transferred to a platform at the w. end of the Tolbooth, a building removed in 1817. The interval between sentence and execution is about three weeks, the nature of the crime not making any difference in this respect. In all parts of the British empire, the convict under sentence of death is allowed to make choice of the spiritual adviser who shall attend on him; and generally, everything that humanity can suggest is done to assuage the bitterness of his fate. At one time, the bodies of murderers after execution were, in terms of their sentence, delivered to professors of anatomy for dissection; and it would appear that in some instances the mangled corpse was made a kind of public show. Such took place on the execution of earl Ferrers, 1760. The body having been conveyed from Tyburn in his lordship's landau-and-six to Surgeons' Hall, was, after being disemboweled and laid open in the neck and breast, exposed to public view in a first-floor room. A print of the time depicts this odious exhibition. The ordering of the bodies to be dissected, having led to great abuse, was abolished in 1832; since this period the bodies of executed murderers are buried within the precincts of the prison, and the bodies of other malefactors are given to their friends. It was also at one time customary to hang the bodies of certain malefactors in chains after execution—as, for example, the bodies of pirates were so hung on the banks of the Thames—but this usage, revolting to public feeling, is likewise abandoned. From the improved state of the criminal law, death-sentences are now of comparatively rare occurrence, and still more rarely are such sentences executed, for, except in cases of deliberate and aggravated murder, the extreme sentence of the law is now usually commuted by the crown into penal servitude for life. The secretary of state for the home department, however, exercises his power in this respect with much care and discretion; and the element of arbitrariness, which might be supposed to spring from differences of temper in different home secretaries, is very seldom obvious.

A great change took place in the public attendance at executions before they were discontinued. Formerly, persons belonging to the higher and middle ranks were habitually present at these dismal exhibitions; many hiring windows at a considerable sum for the occasion. Literature furnishes us with various instances of persons of cultivated mind attending regularly from a morbid love of the spectacle. George Selwyn was fond of seeing executions. His friend Gilly Williams, writing to him of the condemnation of John Wesket (Jan. 9, 1765) for robbing the house of his master, the earl of Harrington, says: "Harrington's porter was condemned yesterday. Cadogan and I have already bespoke places at the Brazier's. I presume we shall have your honor's company, if your stomach is not too squeamish for a single swim."—*Selwyn's Correspondence*, vol. i. p. 323. The earl of Carlisle, writing to Selwyn, speaks of having attended the execution of Hackman, a murderer, April 19, 1779.—*Ibid.*, vol. iv. p. 35. James Boswell, the biographer of Johnson, had a passion for seeing executions, and even for accompanying criminals to the gallows. He was indulged with a seat in the mourning coach to Tyburn, along with the above-named Hackman, the ordinary of Newgate, and sheriff's officer. Visiting Johnson on the 23d of June, 1784, he mentions

that he has just come from the shocking sight of fifteen men hanged at Newgate. Boswell's *Johnson*, vol. viii. p. 331, Croker's edition. At public executions there were to the last considerable crowds, but they consisted chiefly of the lowest of the population. During the excesses of the French revolution, the executions in Paris were enjoyed as a spectacle by crowds of female Jacobins. From the circumstance of these furies employing themselves with knitting needles while attending daily at the scaffold, they became familiarly known as the *tricoteuses* (knitters). Some further information concerning executions will be found in CALCRAFT; CAPITAL PUNISHMENT; DRAWING AND QUARTERING; DROWNING; ELECTRICITY, DEATH CURRENT OF; FOSSA ET FURCA; GUILLOTINE; HANGING; MAIDEN; MURDER; NEWGATE; PARRICIDE; PEINE FORTE ET DURE; TREASON; TYBURN; WHEEL, BREAKING ON THE.

EXECUTION OF DEED, the performance of the ceremonies required by law in order to make a deed binding and effectual. These ceremonies in England consist in signing, sealing, and delivering. According to the ancient common law of England, signature was not necessary to a deed. By 29 Car. II. c. 3 (statute of frauds), signing was required for almost all deeds. But it is still a question which has not been positively decided whether, when a seal is used, it is necessary that the parties should sign. When a party, from any cause, is unable to write, it is usual for him to place his mark in the place of signature. But a mark is unnecessary, and signature by another, at request of the party, is enough. Sealing is the most ancient form of authentication of deeds. In England, deeds are technically known as deeds under seal. A seal is absolutely essential to the validity of an English deed, but any species of seal is sufficient, and in practice a common wafer is usually appended. Delivery is the third requisite to authenticate a deed. Delivery may be made either to the grantee or to another person for him. In the former case, the deed becomes absolute; in the latter, it is called an *escrow*, and does not acquire its full effect till the conditions are fulfilled. Witnesses are not absolutely required to a deed in England, but in practice it is usual that one witness should attest. Before execution, a deed must be read, if required, by a party to it; and if not read, it is void as to the party requesting. Where a person is ordered in chancery to execute a deed or other instrument, and is in prison for failure to comply with the order, the court may make an order that the instrument be executed by the officer of the court; and the execution having been so made, the instrument is equally valid as if signed by the party. The execution of wills in England is regulated by 7 Will. IV. and 1 Vict. c. 26. By this statute it is required that every will shall be signed at the foot or end by the testator in presence of two witnesses. See WILL.

In Scotland, sealing was formerly an essential requisite for execution; but that practice was by 1584 c. 4 dispensed with in regard to registered deeds, and has long fallen into disuse. The solemnities of execution are now regulated by the old acts 1540 c. 117, and 1681 c. 5. By the former of these acts, the signature of the maker of the deed is required, and by the latter, the presence of two witnesses is made essential. In order to a valid execution of a deed or will in Scotland, it is necessary that the maker should sign in the presence of two witnesses, or should in their presence acknowledge his signature, and that the witnesses should then sign their own names, writing after them the word "witness." In case the maker of the deed cannot write, the deed is signed in his presence by two notaries, in presence of four witnesses. But in case of a will, one notary and two witnesses are sufficient. A deed thus witnessed is received as conclusive proof of the facts against the maker. Subscription by initials has been permitted in Scotland. But this mode of execution is irregular, and where it has been adopted, proof has been required that *de facto* the signature was so made. There is one exception to the rule that witnesses must attest the signature—viz., that of a deed or other instrument the whole or the essential parts of which are holograph, i.e., in the testator's handwriting, being valid without witnesses. Bills and promissory notes, receipts, and mercantile accounts do not require to be holograph or attested.

Similarly, in the United States a deed is executed when it is signed, sealed, and delivered; but to make it good against a subsequent purchaser it must be acknowledged before a magistrate and recorded by the officer appointed for that purpose. In some states two witnesses to a deed are required; in others, one witness is sufficient; in others still, the acknowledgment before a magistrate makes any witness unnecessary.

EXECUTIONER, the official who inflicts capital punishment. In England, it is the province of the sheriff to perform this as well as every other ministerial duty enjoined by the criminal courts, but practically he acts by his servants or officers, and he only attends to see the law properly carried out. In royal burghs in Scotland, this duty is imposed on the civic magistracy, one of whom attends for the purpose. In times happily bygone, so numerous were the public executions, that almost every county and town had its E., as an acknowledged officer of justice, with a salary for his subsistence. Yet, we learn that on certain occasions, so odious and so onerous was the duty to be performed, that a special E. was employed. Such was the case at the execution of Charles I. The task of putting this unfortunate monarch to death is well known to have been performed by two men, who, from a dread probably of the vengeance of the royalists, had concealed their faces under visors. In consequence of the mystery thus assumed, public curiosity was much excited, and several persons fell under the suspicion of having been concerned in the bloody deed; rumor even went so far as to

decide who was the wielder of the ax, and who held up the head. It cannot be said, however, that any certainty was ever arrived at on the subject. See *Chambers's Edinburgh Journal*, first series, vol. iv. p. 317.

Like many other offices, that of E. seems to have been at one time hereditary in England. Shakespeare, in *Coriolanus* (act ii. scene 1), makes "Menenius," one of the characters in the play, speak of "hereditary hangmen." In several German states, the office of headman is said to have been also hereditary; certain families being thus, as it were, condemned to perpetual infamy. The last headman of the Tower of London died in 1861. The office was latterly a mere sinecure, and has not been filled up. In some parts of England the office was annexed to other posts; for instance, the porter of the city of Canterbury was E. for the co. of Kent, in the time of Henry II. and Henry III., for which he had an allowance of 20s. per annum from the sheriff, who was reimbursed by the exchequer. The sum of thirteenpence-halfpenny was long popularly spoken of as "hangman's wages;" such sum, equal to a merk Scots, being the fee at one time paid to the E. when he officiated. In the 17th c., this sum, small as it now appears, was considerably above the wages of a skilled mechanic.

From Gregory Brandon, the London E. in the reign of James I., the name Gregory was employed as a familiar designation for executioners for a considerable period. Brandon had the address to procure a coat-armorial from the college of heralds, and became an esquire by virtue of his office. One of his successors was named Dun, or "Squire Dun," as he was called. Dun is referred to in Butler's *Ghosts*, published in 1682:

For you yourself to act "Squire Dun,"
Such ignominy ne'er saw the sun.

He was succeeded about the above year by John or Jack Ketch, commemorated by Dryden (*Epilogue to the Duke of Guise*), and his name has since been synonymous with hangman.—Cunningham's *Handbook of London*, article Tyburn.

Executioners have, in some instances, come to trouble. John Price, the London E., was executed 31st May, 1718, for murder. In the account of him, it is stated that one day, on returning from Tyburn, he was arrested for a debt, which he discharged by a small sum in his pocket, along with the proceeds of the clothes of three felons he had just executed.—*Old Bailey Chronicle*, i. p. 147. If this work can be credited, the E. was about the same time arrested while accompanying John Meff, a criminal, to Tyburn. This arrest, which is amusingly depicted in an engraving, stayed the execution of Meff; being conducted back to Newgate, his sentence was commuted to transportation for 7 years, but having returned to England before the period expired, he was taken and executed. On the 24th May, 1736, the E., on returning from Tyburn, after executing five felons, picked the pocket of a woman of 3s. 6d. (Hone's *Every-Day Book*, ii. p. 695), but what was his punishment is not related. In 1682, Alexander Cockburn, hangman of Edinburgh, was executed for the murder of a bedesman, or privileged mendicant. Early in the 18th c., the E. of Edinburgh was John Dalglish, who acted at the execution of Wilson the smuggler in 1736, and is alluded to in the *Heart of Mid-Lothian*. It was he who also officiated at the execution of the celebrated Maggie Dickson, a woman condemned in 1738 for infanticide, but who came to life again after enduring the sentence of the law, and lived unmolested for years afterwards, as a hawker of salt in the streets of Edinburgh. It is said of Dalglish, that, in whipping a criminal, he made a point of laying on the lash "according to his conscience," which showed him to have been a most considerate executioner. John High, or Heich, accepted the office of Edinburgh E. in 1784, in order to escape punishment for stealing poultry; he died in 1817. See *Traditions of Edinburgh*, by R. Chambers. The emoluments of the Edinburgh E. at one time comprehended a recompense in kind in the markets of the city—viz., a *lock* or handful, and a *gowpen* or double handful, of meal from each sack; hence he received the designation of *lockman*. These emoluments were latterly commuted into a regular salary of 12s. per week, besides a free house, and a special fee of £1 11s. 6d. at each execution; from the exchequer the E. also received a small annual allowance as deemster (q. v.). The last of the Edinburgh executioners was John Scott, whom it was customary to confine in jail for 8 days previous to an execution, in order to insure his attendance; the expenses incurred by him during one of these periods of seclusion being, as we find, £1 2s. 6d., which sum was discharged by the city. Scott was killed by a malicious assault in 1847. Since this period, Edinburgh has had no regular hangman, but, like all other places in Great Britain, depends on the London E., who is hired for the occasion. This personage, until lately, was the well-known William Calcraft. For an execution at Edinburgh in 1854, Calcraft's fee and expenses amounted to £33 14s.; his assistant received £5 5s.; and for taking charge of both, the city criminal officers were paid £1 1s.; total expenses for the execution, £40, independently of the cost of erecting the scaffold. In 1815, the magistrates of Glasgow entered into an arrangement by stamped indenture with Thomas Young, who engaged to act as E. at a recompense of £1 per week, a free house, with coal and candles, a pair of shoes and stockings once a year, and a fee of a guinea at each execution. At Young's death in 1837, his successor, John Murdoch, was recompensed differently. He was paid £1 per month by way of retainer, and the sum of £10 for an execution. After his death Calcraft officiated, he in turn having been succeeded by Marwood. Besides the usual fees, execu-

tioners have from early times claimed the clothes of those who suffer, as a perquisite of office.

The most noted E. of Paris was the late M. Sanson, who officiated at the mournful death-scene of Louis XVI., and is said to have possessed acquirements and feelings not to be expected from one of his degrading profession. He was latterly assisted by his son, M. Henri Sanson. See *Memoirs of the Sansons* (1875). The Parisian E. is familiarly styled "Monsieur de Paris."

No professional E. is employed at capital punishments in the United States. There the sentence is executed by the sheriff, with the assistance of an under-jailer; this last official performing the fatal toilet of the criminal, while the sheriff, by a movement affecting the drop, puts him to death in virtue of the sentence and the law of the state. This seems an advance on the practice in England, where, however, it could not be introduced, for the simple reason that no one fit for the rank of sheriff or magistrate would accept of office with an obligation to perform the duty of E. in prison. The military E. attached to an army is styled provost-marshal (q.v.).

EXECUTIVE. See GOVERNMENT.

EXECUTIVE DEPARTMENT, the branch of the government to which is confided the duty of executing the laws; in distinction from the legislative department which enacts, and the judicial department which expounds them. In the U. S. government, the chief executive officer is the president; in the several states, the governors thereof. The secretaries of state, treasury, interior, war, and the navy, with the postmaster-general, and the attorney-general, are officers of the executive department under direction of the president. The law does not oblige him to consult them, but the custom has made them his counselors and advisers. In the different departments are numerous subordinate executive officers, known as assistant-secretaries, clerks, examiners, solicitors, auditors, controllers, commissioners, deputy-commissioners, directors, chiefs, superintendents, etc. There are also collectors of internal revenue (in districts), and collectors and surveyors of customs (in districts).

EXECUTOR, IN ENGLAND, the person to whom the execution of a last will and testament of personal estate is by testamentary appointment confided (Williams on *Executors*, 197). The appointing by will of an E., without giving any legacy or appointing anything to be done by him, is sufficient to make a will. The appointment of an E. can only be by a will, the person who takes charge of the estate of an intestate being called an administrator (q.v.). The appointment may be either express or constructive, i.e., gathered from the general terms of the will. An early duty of an E. is to take probate (q.v.) of the will. He derives his title solely from the will; the estate vests in him from the death of the testator, at which time his responsibility begins, and from which time he may enter upon all the duties of managing the estate. But his position will not be recognized as suitor in any court until he has taken probate. The whole personal estate vests in the E., and if the testator has made no disposition of the residue, it devolves, by common law and equity, upon the executor. The court, in some cases only, will endeavor so far to carry out the intentions of the testator as not to give the beneficial interest to the E., where there appears from the will a necessary implication that he should not receive it. By 21 Henry VIII. c. 5, an E. is bound to prepare an inventory of the personal estate. This, if required, must be produced. An E. may raise actions in respect to the estate in his charge; and generally it may be said that his powers, duties, and liabilities are commensurate with those of the deceased. He may enter the house of the deceased to remove the personal property. The first claims to be discharged are those of the funeral and the expenses of probate. He must then pay the debts; and he is responsible for paying them in due order, so that those having a legal preference shall first be discharged. An E. is not bound to accept the office; but if he administers, he cannot then renounce the executorship without cause. On the death of an E. the office does not pass to his executor.

An E. to a will in Scotland is called a testamentary E., to distinguish him from the next of kin, who are styled executors. The term E. is given to all who manage the estate of a deceased, whether appointed by will or by authority of the court. The former are called executors nominate; the latter, executors dative. All executors must, before entering upon their duties, obtain *confirmation* (q.v.) from the commissary court. This is equivalent to probate in England. But in Scotland, no right vests in the E. until after confirmation, except a title to sue, being exactly the reverse of the English rule. An E. acting without confirmation is called a *vitious intromitter* (q.v.). Executors must, on entering upon their office, exhibit a full inventory of the whole movable estate of the deceased. An E. is only liable to the extent of the inventory. He is not bound to pay interest on the funds in his hands unless they bore interest before confirmation, or unless he is guilty of undue delay in administering the estate. He is not bound to pay the debts for six months after the death of the deceased. But, as in England, the expenses of the funeral and confirmation are entitled to immediate payment. Servants' wages and a year's house-rent have also a preferable claim. An E. is entitled to claim one third of the *dead's part*, after deducting debts. But should he receive a legacy, he is bound to impute that towards payment of his claim.

An E. in the U. S. is a person to whom another man has committed the execution of his last will and testament. He may decline to act if he choose, in which case the court will appoint an administrator. But if he accept and enter upon the trust he cannot resign it without reason. In general, any person capable of making a contract may be an executor. His duties are to bury the deceased in a manner suitable to the estate left behind, to prove the will, take possession of the property of the testator, make an inventory of the same, collect the assets, and pay the debts and legacies. For this the law gives him all the powers of the testator. Generally an executor is required to give bonds for the faithful discharge of his duties.

EXECUTORS, in Scotland, the heirs in *mobilibus* of a person deceased. They are the whole next of kin in the nearest degree in blood; but where the heir to the heritage is one of the nearest of kin (e.g., the oldest son), he is not entitled to share in the movables without collation (q.v.). The order of succession among executors is first descendants, then collaterals, or brothers and sisters, and their children; and, lastly, ascendants, i.e., the father and those claiming through him. But the mother and her family, till recently, were not allowed to succeed to her own child *ab intestato*. This harsh rule was so strictly carried out, that where there were no relations by the father, the crown succeeded as *ultimus hæres*, to the exclusion of the mother.

By 18 Vict. c. 23, the law of succession to movables has been in some degree altered. On the death of an intestate leaving no issue, his father, if he survive, is entitled to take one-half of the movable estate, in preference to brothers and sisters. If the father be dead, the mother takes a third. No further provision, however, is made for the mother in case she is the only surviving relative. The result is, therefore, that the other two-thirds would still go to the crown. See SUCCESSION, MOVABLES.

EXECUTORY DEVISE, in statute law, is such a limitation of a future estate or interest in lands or chattels (though in the case of chattels it is more properly a bequest) as the law admits in the case of a will, though contrary to the rules of limitation in conveyances at common law (Blackstone, *Comm.* ii. 334). By common law, a freehold cannot be limited on a freehold, as an estate to A and his heirs; but if he die before he attain the age of 21, then to B and his heirs. Nor can an estate be given to commence at a time uncertain, as to A when he returns from Rome. But though these limitations would be void in a deed, common law will sustain them as executory devises. This form of limitation is restrained by the law against perpetuities (q.v.), which requires that the estate must take effect within a life or lives in being and 21 years after. The law will not interpret a limitation as an E. D., if it can be otherwise sustained. Whenever, therefore, a future interest in land is so devised as to fall within the rules laid down for the limitation of contingent remainders, such devise will be construed as a contingent remainder, and not as an executory devise (Cruise, *Digest*, vi. 369). An E. D., unlike a remainder, cannot be defeated by any act of the first taker or devisee; when, therefore, an absolute power of disposition is in the first taker, the limitation over is not an executory devise. Within the period allowed for these estates, an E. D. constitutes a species of estate tail; and for this purpose, it is frequently used in America.

EXEGESIS (from Gr. *ex*, out of, and *hēgeomai*, I lead) properly signifies the exposition or interpretation of any writings, but is almost exclusively employed in connection with the interpretation of sacred Scripture, to which, therefore, the subjoined remarks specially apply. The expositor or interpreter is called an *exegete*. To interpret a writing, means to ascertain thoroughly and fundamentally what are the conceptions and thoughts which the author designs to express by the words he has used. For this purpose, it is necessary, in regard to books written in a foreign language, that the exegete should know well, first, the precise signification of the words and idioms employed by the writer. This is termed *grammatico-philological* exegesis. In the next place, he must be acquainted with the things denoted by these words, and also with the history, antiquities, and modes of thought of the nation. This is termed *historico-antiquarian* exegesis. Both together constitute *grammatico-historical* exegesis. When only an exposition of the system of thought contained in a writing is sought after, this is termed *doctrinal* or *dogmatic* E.; while the investigation of a secret sense, other than that literally conveyed by the words of a writing, is termed *allegorical* exegesis. But if a writing is regarded from a practical point of view, and in reference to its bearing upon life and manners, the exposition is termed *moral* exegesis. The complete and coherent E. of a writing forms what is called a *commentary*, but, if restricted to certain difficult words or knotty points, the elucidations are termed *scholia*. The scientific exhibition of the rules and means of E. is called *hermeneutics* (q.v.). In the earliest ages of the Christian church, the allegorical method of E. prevailed. By the Alexandrian school in particular, it was greatly abused. Origen, however, the greatest of this school, deserves high credit for endeavoring to secure a basis for grammatical E., by a sharp separation of the literal, the moral, and the mystical sense of Scripture. Besides the Alexandrian school, the Syrian historico-exegetic school had many adherents in the east. Among these may be mentioned Cyril of Jerusalem, Ephraem Syrus, John Chrysostom, and Theodorus of Mopsuestia. First, towards the end of the 4th, and during the 5th centuries, a narrowing of the principle of the free interpretation of Scripture begins to be

observable, through the rapid development of monkery and the hierarchical system; in consequence of which, the importance of the classic writers was undervalued, and the study of them ultimately abandoned in the western church, while a feeling of superstitious reverence, wholly unintelligent and unscriptural, grew up for the letter of the "Word," and E., if employed at all, was employed simply to bolster up preconceived views. By and by, independent E. was supplanted by the well-known *Catenæ*, consisting of expositions of books of Scripture strung together from the writings of the older church fathers. In the east, the first of these was got up by Procopius, 520 A.D.; in the west, by Primasius, 550 A.D. Although much was done for the E. of the Old Testament by eminent Jewish scholars, such as Solomon, Jarchi, Aben-Esra, and David Kimchi, Christian theologians for the most part, knowing only the text of the Vulgate, stuck, during the dark ages, to the interpretations of the fathers. First in the 12th, 13th, and 14th centuries, efforts were made by individual scholastics, especially by Abelard, St. Bernard of Clairvaux, Thomas Aquinas, and Nicholas of Lyra, to reintroduce something like a grammatico-historical E. of Scripture. But it was mainly to the great revival of letters in the 15th c., and the humanistic scholars whom it produced, such as Laurentius Valla, Erasmus, etc., that an advance in E. was owing. The Complutensian polyglott also exercised a great and beneficial influence. Shortly after, the reformation gave an impulse to E., so powerful, that it is felt at the present day; and, indeed, its effect is far more visible in the recent biblical criticism of Germany than it was in the days of Luther himself. The desire for the unfettered E. of Scripture strongly animated the reformers, but, in fact, the long black night of ignorance—known as the dark and middle ages—has influenced them too, and disqualified them for framing at once a comprehensive exegetical science. It required a couple of centuries to recover from the effects of mediæval ignorance. The more important Lutheran exegetes are: Luther, Melancthon, Brenz, Joach. Camerarius, Strigel, Chemnitz, etc.; of the reformed or Calvinistic school may be mentioned Calvin, Zwingli, Ecclampadius, Bucer, Beza, Bullinger, Grotius, Clericus, etc.; and of the Roman Catholics, especially Paul Sarpi. During the 17th c., the E. of Scripture was for the most part at a stand still, but about the middle of the 18th c. it suddenly revived. This revival was due principally to Joh. Aug. Ernesti (q.v.), and J. Sal. Semler (q.v.), who established new principles of criticism and hermeneutics, through which grammatico-historical E. once more began to make its appearance. The labors of Wetstein and Kennicott in regard to biblical MSS. were of immense service. Since their day, on to the present, criticism has been constantly at work on the writings of the Old and New Testament. Cognate languages have been more and more profoundly studied; the antiquities of the east, of Egypt, Assyria, Arabia, and other countries, have been investigated, and brought to bear on the subject; the manners and customs which prevail in these lands, and which, in some of them, have prevailed from time immemorial; the laws that determine the growth of civilization in nations, and enable us to enter into and comprehend the condition of mind peculiar to races in a primitive stage of development, and to appreciate their modes of thought, and to weigh the value of their literary and religious records—all these have received, and are still receiving careful attention at the hands of numerous scholars, so that it is not too much to say that we are at the present day better fitted—so far as outward helps go—to understand the real meaning of Scripture, than those who have lived at any other period subsequent to its composition. Among the eminent names in the recent development of biblical E. are F. A. Wolf, J. Dav. Michaelis, Eichhorn, Gesenius, Wahl, Bretschneider, Winer, Rosenmüller, Hitzig, Hirzel, Ewald, Umbreit, De Wette, Knobel, Lücke, Paulus, Meyer, Olshausen, Hengstenberg, etc. The influence of the *grammatico-critical*, and *critico-historical* E. of modern Germany, is only beginning to make itself felt in this country. The most important contributions to the science recently made by British scholars, are those by Conybeare and Howson, Alford, Stanley, Jowett, Ellicott, etc.

EXELMANS, REMY JOSEPH ISIDORE, Comte, a distinguished French general, b. at Bar-le-duc, 13th Nov., 1775. He entered the army in 1791, was promoted to the rank of capt. in 1799, served with distinction in the campaign of Naples under Macdonald and Championnet, and in 1801 was attached as aide-de-camp to the staff of Murat. In 1808, while with Murat in Spain, he was arrested, and sent to England, where he remained a prisoner for three years. He was with Napoleon in the Russian campaign in 1812, for his brilliant conduct in which the emperor created him gen. of division, Sept. 8th of the same year. E. seems to have been equally esteemed under every successive government. On the fall of Napoleon, he was for some time banished from France, but was permitted to return in 1819. In 1831, Louis Philippe restored his titles and rank. Louis Napoleon named him grand chancellor of the Legion of Honor, and on Mar. 11, 1851, raised him to the dignity of *maréchal de France*. On the 21st July, 1852, E. had a bad fall from his horse, from the effects of which he expired on the following night.

EXERCISE, a very important element of medical regimen, both in the preservation of health and in the cure of disease. To preserve all the functions of the body in healthy action, it is necessary to secure their due and regular action or E.; to allow of complete inaction of any part or function, is to initiate disease, and probably even

structural change, or atrophy. Hence the development of the muscular system, of the secretions, and even of the mind and its organ, the brain, require the more or less regular use of E., either in the form of productive and useful work, or by means of artificially devised methods calculated to serve a like purpose in regard to the economy. Thus, scholastic education is exercise for the mind; gymnastics (q.v.), for the body. Both these means enter largely into enlightened medical practice, though they are often too much neglected. E., to be beneficial, must be attended with rest, to allow the tissues which are worn away during vital action to be restored.

EXETER (the *Civ-Isce* of the Britons, the *Isca Damnoniorum* of the Romans, *Exan-cestre* of the Saxons), a city, episcopal see, separate county, parliamentary and municipal borough, and river-port, in the s.e. of Devonshire, and the capital of that county. It lies on an acclivity on the left bank of the Exe, 10 m. n.w. of its mouth, 170 m. w.s.w. of London, and 73 m. s.w. of Bristol. It is on the whole well built and clean, and has two main lines of street meeting near the centre. There are some fine squares and terraces. The guild-hall has a singular portico, added in 1593, and projecting into the street. It was restored, with considerable regard to artistic effect, in 1864. E. cathedral, a cruciform structure, magnificent in its ornamentation, was erected 1112-1478. In one of its towers is the Great Tom of E. or Peter's bell, 12,500 lbs. weight, and a large curious antique clock. It measures 408 feet by 76, but across the transepts is 140 feet wide. Being only 66 feet high, it gives the impression of a long, low building. It has massive towers on the sides, which are in the original Norman style of architecture, and which are 130 feet high. It contains a fine choir screen, dating from the early part of the 14th century. The chapter house has several thousand valuable manuscripts. Among the other buildings are St. John's hospital, founded in the reign of Henry III.; the Albert Memorial Museum, opened in 1868; a post office, lunatic asylum, and almshouses. E. has a large floating ship-basin, and a ship-canal extending to Topsham. E. has magnificent nurseries, and exports dairy, farm, and orchard produce from a neighborhood rich in such products. The town sends one member to parliament. E. was anciently the chief residence of the West Saxon kings. E. bishopric, fixed here in 1050 by Edward the confessor, includes Devon and Cornwall, 23 deaneries and 588 benefices. The city was formerly surrounded with walls and strongly fortified. On a height to the n. of E. are the ruins of Rougemont castle, built by William I., on the site of one said to be as old as Caesar's time. Many Roman and Greek coins have been found in E., besides tessellated pavements, fragments of columns, and small bronze statues. Pop. 1891, 37,404.

EXETER, a town, village, and one of the co. seats of Rockingham co., N. H., on Squamscott river and the Boston and Maine railroad; 50 m. n. of Boston. The town is built around the falls, and the chief business is manufacturing, especially cotton, iron and brass goods, machinery, and shoes. Here is the richly endowed Phillips academy, which for generations has had a national repute, founded in 1781 by John Phillips; also the Robinson female seminary, with large endowment, a high school, and several graded schools, public library, churches, state and savings banks, water works, gas lights, and daily and weekly newspapers. The place was settled in 1638 by the Rev. John Wheelwright, an exile from Massachusetts. It suffered greatly in the various Indian wars of the century, and 38 of its citizens died in the continental army. It was the capital of the state during the Revolution. Pop. '90, 4284.

EXETER BOOK, THE, also called the *Exeter Codex*, is a manuscript collection of early English poetry written before the Norman conquest, or, before the period of English literature actually began. The collection was presented to the library of Exeter cathedral during the reign of Edward the Confessor by Bishop Leofric. It contains poems of King Alfred, Caedmon, Alfric, Cynewulf, and some others, besides a number of riddles.

EXETER COLLEGE, Oxford. This college was founded in 1314 by Walter de Stapledon, bishop of Exeter, who removed from Hart Hall to the present site of E. C., a rector, and twelve fellows. In 1404, Edmund Stafford, bishop of Salisbury, added two fellowships, and gave the college its present name. Sir William Petre, in 1565, founded eight more; and in 1636, Charles I. annexed one more for the islands of Jersey and Guernsey. In 1770, Mrs. Sheers left certain rents for the establishment of two fellowships. All these fellowships were originally appropriated to various archdeaconries or counties, especially in the w. of England. A peculiarity in this college was, that the above foundations, though generally called fellowships, were, strictly speaking, only scholarships. Important changes were introduced by the rector and fellows, under the authority of 17 and 18 Vict. c. 81, and approved of by the commissioners appointed to carry out that act. The number of fellowships was reduced to 15—all open without any restriction as to place of birth. The revenues of two fellowships were divided among the rectorship and the 15 fellowships. The remaining 8 fellowships were devoted to the foundation of 22 scholarships; ten open without restriction; ten limited to persons born, or for three years educated in the diocese of Exeter; and two limited to persons born in any of the Channel islands. Several exhibitions also are attached to the college; and there are about 16 benefices in the gift of the society. The number of names on the books is about 750.

EXETER, or **EXON DOMESDAY**. See **DOMESDAY BOOK**.

EXETER HALL, a large proprietary building, on the n. side of the Strand, London, is 131 ft. long, 76 ft. wide, and 45 ft. high. It was completed in 1831, and can contain upwards of 3,000 persons. It is let chiefly for religious assemblies, and is in great request during the "May Meetings" of the several religious societies. It is also let as a concert-room and has been the scene of many great musical fêtes.

EXFOLIATION (Lat. *exfolio*, "I strip of leaves."), signifies in one use of the word, a separation and scaling off, as of a rock or a mineral; in another use it denotes a throwing off a dead from living tissue, as, of a piece of dead bone. See NECROSIS.

EXHAUSTIONS, METHOD OF, is a mode of proving mathematical propositions regarding quantities by continually taking away parts of them. The method was frequently employed by the ancient geometers; its fundamental maxim, as stated by Euclid, being that those quantities are equal whose difference is less than any assignable quantity. Euclid employs the method in Book x. Prop. 1; and it was used by Archimedes to prove that the area of a circle is equal to that of a right-angled triangle whose one leg adjoining the right angle is the radius, and the other the circumference. In this ancient method we may see the rudimentary form of the modern transcendental analysis.

EXHIBITION, INDUSTRIAL (Fr. *Exposition de l'Industrie*). Exhibitions of this kind originated in France, where the first took place in 1798, at the suggestion of the marquis d'Avèze. It was held in the Maison d'Orsay and its grounds; but it appears to have been rather a collection of such objects of French art-manufacture as could be borrowed from their owners, than an assembling together of competing artists and manufacturers, with their respective works. It is, nevertheless, interesting as a historical fact, having been the first of these displays of which we have any clear and authentic record; and its more important effect was to familiarize the French mind with national exhibitions.

In the same year, another exhibition was held in Paris, on a grander scale, and with considerable success. It embraced all kinds of manufactures; whereas that at the Maison d'Orsay was chiefly devoted to those of artistic merit; hence the credit has been claimed for the latter one of being the commencement of industrial exhibitions, certainly, however, without justice or truth.

In consequence of the obvious utility of the exhibitions of 1798, another was held in 1802, under the consulate of Napoleon, with equal success, and thus led to the establishment of triennial exhibitions, which were, with occasional interruptions from political causes, held until the novel idea was originated in Gt. Britain, in 1850, by his royal highness the prince consort, of holding a universal exhibition open to all comers.

That was not, however, the first industrial exhibition held in the United Kingdom. The Royal Dublin society, possibly from the French sympathies of Ireland during the revolution, as early as 1829 adopted the plan of triennial exhibitions, which was several years before any other part of the United Kingdom; they took place in the society's rooms in Dublin. Like the French, however, they at first comprised only specimens of native industry.

In England, the first well-organized exhibitions were those of the Cornish polytechnic society, in which were illustrated the mineral wealth of the co., and its mechanical appliances for mining purposes, etc. These were continued annually without intermission until 1850. Manchester, Birmingham, and Liverpool also held local exhibitions; that of the second town was by far the most important, and is fairly entitled to be considered the prototype of the 1851 exhibition; indeed, it is by no means certain that both did not arise from the same cause—the agitation in favor of a great national exhibition, commenced by his royal highness the prince consort and the society of arts as early as 1848. The Birmingham exhibition was held in 1849.

The Manchester exhibitions were the earliest held in the great English industrial towns, but they, like those which were held in the mechanics' institutes of Liverpool and Leeds, and subsequently in the collegiate institution of Liverpool, had a mixed character, the illustrations of art and manufactures being pretty well mingled with objects of natural history and various other curiosities, for the amusement of the visitors. That of Birmingham, however, was much more completely devoted to the true objects of industrial exhibitions; it was held in the spacious apartments of Bingley hall, and was a great success, especially when it is borne in mind that it was carried out solely by private enterprise. The multitudinous manufactures of that wonderful place were amply illustrated, and a most careful attention was paid to the exhibition of those objects of art which were best calculated to foster the taste of designers, and others, whose duty it was to give refinement to the masses, by gradually improving those objects of necessity and ornament in every-day use.

The first metropolitan movement in favor of holding a national exhibition in Gt. Britain was immediately after the French exposition of 1844, the results of which were so beneficial, that several applications were made to the government requesting that the matter should be officially taken up. The government, however, as usual, proved itself to be simply executive, and did nothing.

In the meantime, the society of arts tried the experiment of holding exhibitions annually in their own building in the Adelphi; but these, though eminently successful, were not sufficient to satisfy those with whom a national exhibition had become a fixed

idea. In 1849, his royal highness devoted himself thoroughly to this object, and made the happy suggestion of throwing open the exhibition to all nations. The plans, too, were suggested for raising the necessary funds and other essential points, and the scheme soon took a tangible form; and it was finally determined by the government to issue a royal commission, which was gazetted Jan. 3, 1850. From this moment the great exhibition was fairly launched. In order to enable the commissioners to enter into contracts, and otherwise incur obligations, it was necessary to procure subscriptions to a guarantee fund. The subscription-list was opened by the queen with £1000. The exhibition took place in a vast structure of iron and glass, called the crystal palace, in Hyde park, London. The edifice, planned by sir Joseph Paxton (q.v.), was opened by her majesty, May 1, 1851. It was 1851 ft. long by 456 ft. broad, and 66 ft. high; the entire area covered being 13 acres. On the ground-floor and galleries there were 8 m. of tables. The glass employed in the structure weighed upwards of 400 tons. The number of exhibitors exceeded 17,000. The exhibition was open 144 days, being closed Oct. 11. The entire number of visitors was 6,170,000, averaging 43,536 per day. The largest number at one time in the building was 109,760, on Oct. 8. The entire money drawn for tickets of admission amounted to £505,107; and after all expenses were defrayed, a balance of £150,000 was left over; so that there was no call on those who subscribed the guarantee fund. Popularly, this great exhibition was properly enough called the world's fair, for it attracted visitors from all parts of the world. When the exhibition was over, the building was cleared away.

The importance of this celebrated exhibition was so obvious, that other countries became anxious to have something of the same kind. An exhibition was held in Cork in 1852; although not of international character, it was the first for which any special structure was erected in Ireland, and deservedly gave great satisfaction. The home manufactures of Ireland were admirably displayed in conjunction with those of other parts of the kingdom. Dublin got up an international exhibition in 1853, and by the princely munificence or Mr. Dargan, was enabled to make an admirable display, in a building of great beauty. The Dublin society added a new feature—high art was associated with industrial art, and a gallery of pictures, the finest ever brought together in Gt. Britain before, was there exhibited with great success. In the same year, a similar exhibition took place in a crystal palace in New York. France, in 1855, repeated the same experiment with immense success; both the industrial and the art collections were such as the world had never seen before. Though wanting the imposing magnitude of the Hyde park building, the contents of the palais de l'industrie, with its detached picture-gallery and its annexe, were of the choicest description, and reflected the highest credit on French taste and skill. Several other continental nations followed with various success. In Europe, it has now taken root, and every country looks upon an exhibition of its industrial resources and productions, from time to time, as a grand necessity which must be met. In 1861, there was an exhibition at Haarlem, in which a vast assemblage of admirably arranged specimens illustrated every industry followed by the most industrious and methodical people of Europe. In Belgium, also, a small industrial exhibition was held in 1861 at Brussels, consisting chiefly, however, of articles of use, in which tasteful design was the chief consideration.

Such is a brief outline of the early history of these exhibitions, which now form a prominent feature in this era of the history of civilization. The fullness of their effects is still to be seen, but, judging of the beneficial effects they have already produced, it is not too much to say, that they appear destined to help most largely in diffusing a love of industry, and a peaceful emulation over the whole globe. Commerce may have its weak points, even its meannesses, but it cannot be denied that few of the occupations of man are more humanizing, or tend more to teach the value of peace and good-will; and if this be conceded, certainly nothing can more assist it than these great gatherings, in which each nation shows its own specialities, and gives to others the ideas which it has accumulated through its centuries of progress in industrial art. Like the social interchange of thought, this interchange of inventive genius brings out new talents; and succeeding generations will reap a rich harvest of results from our industrial exhibitions. To mark the advance in the arts of the interval, and promote manufacturing and commercial activity, an exhibition, on a still greater scale, was arranged to take place at Kensington, London, in 1862; in which were to be comprehended paintings in a high style from all countries. See *Official, Descriptive, and Illustrated Catalogue of the Great Exhibition of 1851* (3 vols.); also *Reports by the Juries* (2 vols.); and the 13 vols. folio, printed by the commissioners.

Since the article on this subject first appeared several international exhibitions have been held—one in 1862 in London; in 1865 in Dublin; in Paris in 1867; in 1873, the great universal exhibition of Vienna; that of Philadelphia in 1876; of Paris, 1889; of Chicago, 1893, etc. That of 1862 was held in a vast brick building, lighted by a roof and two immense cupolas of glass, designed by Capt. Fowke, R.E., and erected on a large space of land acquired by the royal commissioners of the great exhibition of 1851, adjoining the beautiful garden of the horticultural society at South Kensington. The space covered was 1,291,800 sq. ft., or about 17 acres, including some portions of the buildings of the garden, lent by the horticultural society, for refreshment-rooms, etc. Of this vast space, 391,146 sq. ft. were occupied by objects exhibited, besides

284,670 sq. ft. of wall and other vertical space made by internal partitions, etc.; to which must be added 93,220 of horizontal and vertical space occupied by works of art, arranged in one of the most admirably constructed galleries ever designed for such a purpose. The entire cost of this gigantic affair was £321,000. This was secured against all risk of failure by a voluntary guarantee entered into by 1152 gentlemen of all ranks, who pledged themselves in various sums amounting, in the aggregate, to £450,000. Notwithstanding much opposition and ill-feeling, the international exhibition of 1862 proved a great success. Like its predecessor in 1851, it gave a vast impetus to trade generally, and it enabled the public to form correct opinions upon the progress of manufactures, and their shortcomings when compared with others.

The next exhibition of importance was that held in Dublin in 1865, which was originated by a company, whose object was to establish the principle of decennial exhibitions, and, if possible, make this one pay the expense of erecting the magnificent building in which it was held, and thereby form a permanent home for such exhibitions and other useful purposes in future. This building was of brick, covered with stucco, and the roof of glass and iron, light but commodious galleries running entirely round the interior. The whole surface occupied by the structure was 5,700 sq. yards. It was, in every respect, well adapted for the purposes for which it was raised, and had an extensive pleasure-garden nearly surrounding it. The exhibition was successful in everything but its pecuniary results. It was amply patronized both by foreign exhibitors and visitors, and like that of 1862 in London, and the previous ones of Dublin and Paris, it combined fine arts with the manufactures, mining, and other industries.—The year 1867 witnessed, in Paris, the greatest, up to that time, of all international exhibitions, both with respect to its extent, and to the scope of its plan. Its site was on the Champ-de-Mars, the great military parade-ground of Paris, and it occupied the enormous space of 37 acres. It consisted of a large building of an elliptical form, arranged in twelve concentric circles, with a small open central garden. The outer circle was much more lofty and broader than any of the others, was roofed with corrugated iron, and lighted with clerestory windows, and was devoted to machinery of all kinds, and to the processes of manufacture in various branches of industry. Outside this circle were placed practical illustrations of the food department, in the form of restaurants of all nations—the exhibition of specimens of food substances being in small courts within the outer wall, or back to back with the restaurants. The first circle within that for machinery was for metallurgy, chemistry, dyeing, etc.; then followed textile materials, clothing, household furniture, personal ornaments, plate, porcelain, etc.; then matters relating to general and special education. Then came the gallery of fine arts, in which the paintings, sculpture, and other fine-art works of all nations were exhibited; and within this circle, again, was another, in which an archæological collection from each country was displayed, for the purpose of showing the rise and progress of industrial art in every country. This was a novel and most valuable addition, admirably conceived and carried out. Another most important feature in the Paris exhibition was the park, or out-of-door portion, which occupied by far the larger part of the whole space. In this were shown actual examples of the styles of domestic and palatial architecture of most countries, and even the tents of some of the nomad tribes, such as the Kirghis Tartars, and Samoyeds of the Russian empire, the Bedouin Arabs, etc. The beasts of burden of different nations, such as horses, camels, etc., were also shown, and all kinds of civil and military erections of general importance. The exhibition had great and deserved success; it was visited by most of the principal monarchs of the world, and vast multitudes of people. Pecuniarily, however, it did not succeed.

Since the Paris exhibition of 1867, there have been important ones held in Sweden (1868) and in Denmark (1872); at Moscow (1872); Vienna (1873); Philadelphia (1876); Paris (1878); Amsterdam (1883); Calcutta (1884); Antwerp (1885); Edinburgh (1886); Brussels (1888); and the very magnificent exhibition given in Paris in 1889, in the Champ de Mars, for which among other remarkable structures the Eiffel tower was erected, and which was, perhaps, the most successful exhibition that had been held in any country prior to the Columbian Exposition of 1893.

The quasi-international Moscow exhibition of 1872 was organized by the Moscow polytechnic society, and merely patronized by the government. It was, however, on a large scale and admirably managed—its various buildings, etc., completely occupied the Alexandra gardens round two sides of the Kremlin, a length of over two English m., and the great riding-school. In its arrangement the greatest skill was shown, and its classification was the best and most scientific which has ever yet been attempted. Each special group of objects had separate buildings. Thus, for instance, medical science, which was fully represented, had a series of buildings, three model hospitals, besides those in the military department—all fully furnished—dispensaries, a pharmacist's shop, and a garden in which all the medicinal plants were growing; an exhibition of all kinds of surgical instruments and appliances, and a great variety of other matters appertaining to medicine and surgery; a dentist's establishment, with everything appertaining to dentistry, whether to the treatment of natural teeth, or the manufacture of artificial ones; and so on. Should ever a great international exhibition be carried out on the same grandly conceived plan, it will be the greatest educational effort possible.

The two Scandinavian ones in magnitude exceeded those held in Dublin; they were very interesting, and were under good management successful in all respects.

The Vienna exhibition of 1873 far exceeded in magnitude any previous one, and although unfortunate in many respects, was, upon the whole, an event of which Austria has good cause to be proud; and its ultimate results, there is every reason to hope, may show great commercial benefits, as it brought every civilized nation to Vienna, and doubtless will be the means of extending Austrian commerce, by making the general excellence and great variety of Austrian and Hungarian manufactures better known. The main building, which still remains, was the largest that had been constructed, being nearly four times the size of that in which the Paris exhibition of 1867 was held: it consists of a vast gallery or nave, 2,980 ft. in length, in the exact center of which is placed a great central hall, 426 ft. in diameter, covered with a conical iron roof and lantern rising to the height of 160 feet. At each extremity of the main avenue, another gallery, 660 ft. in length, is placed transversely to the chief one, and another of similar length crosses the nave at a distance of 114 ft. from each of these terminal transepts, whilst each of these pairs have their extremities connected by ranges of offices. Sixty-six ft. from the central rotunda on each side is a similar transept connected by two others parallel to the line of the main avenue, and thus forming a square inclosing the rotunda. Ten other transepts cross the main avenue; the height of all the galleries being about 50 feet. Vast as this structure was, it was found insufficient; and numerous halls and other annexes had to be built. The entire extent under roof is said to have exceeded 60 acres. A severe outbreak of cholera, and a deplorable monetary crisis occurring during the exhibition, marred its success.

The next great international exhibition was that of the United States of America, which was held in Philadelphia in 1876, in honor of the centenary anniversary of American independence. The main building was 1876 ft. long, and 464 ft. broad. The machinery-hall was 1400 ft. long, and in all no less than 190 buildings were erected for the purposes of the exhibition. The work of preparation and building occupied 21 months. Between the 10th of May, when the exhibition was inaugurated with elaborate ceremonies, till Nov., it was estimated that no fewer than 8,000,000 paid for admission. Both commercially and in other respects, this memorable enterprise was very successful. See CENTENNIAL EXHIBITION.

The next exhibition in the western hemisphere was that at New Orleans, Dec. 16, 1884–May 31, 1885; reopened in Nov., 1885, for a short time; organized by the Cotton Planters' Association. There were 29 large buildings and 23,000 exhibitors. In the spring of 1891 a very successful international exhibition was opened on the island of Jamaica by Prince George of England. The great exhibition opened in Chicago May 1st, 1893, to commemorate the discovery of America, was under the dual control of a commission of 113 members appointed by Congress and a corporation of 45 citizens established under the laws of the state of Illinois, consisting of 45 prominent citizens of Chicago. By act of Congress, the sum of \$1,500,000 was provided for the erection of special buildings for government exhibits. The city set apart 560 acres in Jackson Park and 80 acres in Midway Plaisance. The President of the United States invited by proclamation of Dec. 24, 1890, the participation of foreign nations; and on Oct. 21, 1892, the Vice-President, representing the President, dedicated the Exposition, the oration being pronounced by Mr. C. M. Depew of New York. The formal opening was on May 1, 1893, having been preceded by a great naval review in New York Harbor (April 27), in which, besides the United States, war-vessels from England, France, Germany, Russia, Spain, Italy, Holland, Brazil, and Argentina participated. The buildings at the Columbian Exposition surpassed in size and beauty those seen at any previous World's Fair. The cost of this Exposition is estimated at \$25,000,000. See WORLD'S COLUMBIAN EXPOSITION.

EX'MOOR FOREST, a moory, mostly uncultivated waste, consisting of dark ranges of hills and lonely valleys, 14 sq.m. in area, in the w. of Somersetshire and n.e. of Devonshire. It is bordered by deep wooded glens.

EX MOUTH, a t. in the e. of Devonshire, on the left bank of the mouth of the Exe, 10 m. s.e. of Exeter. It stands at the base and on the slope and top of a hill rising from the sandy estuary of the Exe. It is noted for its mild climate. From about 1700, it was the chief watering-place on the Devon coast, till the rise of Torquay. There are promenades, baths, terraces and pleasure-grounds along the shore. The Woodbury Hills on the e., 800 ft. high, protect it from the e. winds. Here Swend the Dane landed in 1003. It was taken by the royalists in 1646. Pop. '81, 6245; '91, 8097.

EXMOUTH, EDWARD PELLEW, Viscount, a famous naval commander, was b. at Dover, April 19, 1757. He entered the navy when 13 years of age, and first attracted notice by his gallant conduct in the battle on lake Champlain, Oct. 11, 1776. In 1782, he attained the rank of post-capt. In 1793, having been appointed to the command of the *Nymph*, a frigate of 36 guns, he encountered, and, after a hard-fought battle, captured *La Cleopatre*, a French frigate, which carried the same number of guns. For this victory, he was knighted. In 1799, he received the command of the *Impétueux*, 78 guns, and was sent to the French coast, where many of his most brilliant actions took place. In 1804, sir E. Pellew was advanced to the rank of rear-admiral of the Red; in 1808, to that of vice-admiral of the Blue; and in 1814, he was raised to the peerage, with the title of baron E. of Canonteign, Devonshire, with a pension of £2,000 a year. In 1816, he was sent to Algiers, to enforce the terms of a treaty regarding the abolition of Christian slavery, which the dey of Algiers had violated. With a combined fleet of 25 English and Dutch vessels, he bombarded the city for seven hours, and inflicted such immense damage, destroying all the Algerine fleet and many of the public buildings,

that the dey consented to every demand. E., who had been wounded in the leg and cheek in this action, received on his return to England the thanks of both houses of parliament, and was promoted to the rank of viscount, 10th Dec., 1816. In 1821, he retired from public service, loaded with honors. He died 23d Jan., 1833.

EXOCETUS. See FLYING-FISH.

EXODUS ("the departure"), the name given to the second book of the Pentateuch. It may be regarded as composed of two parts—the first historical, and the second legislative. The historical extends to the end of the 18th chapter. It embraces a narrative of the various preparations, natural and supernatural, made under the providence of God for the deliverance of the Israelites from their bondage in Egypt, and also describes the accomplishment of their deliverance, and the journeyings of the people in the wilderness as far as Mt. Sinai. The legislative is devoted to a minute and elaborate account of the institution of the theocracy. The book presents us with three aspects of Hebrew history. We have, first, a picture of a people enslaved; second, of a people redeemed from bondage; and third, of a people sanctified and set apart, to the service of God. The period embraced by the history of the book is usually reckoned at 142 or 145 years, which number is obtained as follows: From the death of Joseph to the birth of Moses, 60 or 63 years; from the birth of Moses to the departure from Egypt, 80 years; and from the departure out of Egypt to the erection of the tabernacle, 1 year. It cannot be denied, however, without wildly violating all the ordinary laws of the increase of population, that this is much too short a period to account for the existence of such a number of Hebrews as left Egypt—viz., 600,000, exclusive of women and children—i.e., in all, at least, 2,500,000. Those who went down into Egypt with Jacob were "threescore and ten souls," and in 215 years, these, though prohibited from intermarrying with the Egyptians, had amounted to between two and three millions. The writer of E., indeed, says (chapter xii., verse 40) that "the sojourning of the children of Israel, who dwelt in Egypt, was 430 years," adding that they left the land "even the self-same day" on which they had entered it. This statement, however, does not seem to harmonize with the author's previous narrative, and is certainly inconsistent with the language of the apostle Paul, who says (Gal. iii. 17) that the law was given 430 years after the covenant with Abraham, which took place about 215 years before Jacob and his sons went down into Egypt, so that, according to this view, the Israelites could only have been in Egypt 215 years. This is the number commonly accepted; but it is not wonderful that some writers should affirm that "it would be more satisfactory if we could allow 430 years for the increase of the nation in Egypt rather than any shorter period." A still longer period would undoubtedly afford additional satisfaction; and Bunsen, in his *Ägypten's stelle in der Weltgeschichte*, endeavors to show that the Israelites were in Egypt for *fourteen* centuries instead of two, and that the number 215 only indicates the period of oppression, the time when they were "evilily entreated." This conclusion is, of course, arrived at by the application of principles of criticism not generally recognized in the schools of British theology; but there seems no avoiding the conclusion, that the usual chronology is hopelessly wrong.

May it not be that the interval which elapsed between the death of "Joseph and all his brethren, and all that generation" (E. i. 6), and the period when there arose up a new king over Egypt which knew not Joseph (E. i. 8), was much longer than we suppose? The passage itself in E. seems to favor this idea; for the intervening verse (E. i. 7) speaks of the children of Israel "increasing and multiplying, and waxing exceeding mighty, and filling the land," without any reference at all to the time occupied in this process; and such words are certainly more applicable to a series of centuries than of years, while centuries, besides, would harmonize better than years with the statement that the Egyptian king knew not (i.e., had forgotten all about) Joseph. The only grave objection to this otherwise extremely probable hypothesis, is its incompatibility with the statement of St. Paul; an objection, however, which Luther would not have found insurmountable, for in an exactly similar case he said of the inspired Stephen that "he was no historian, and did not trouble himself about particulars."—*Zu Apostelgesch.* vii. Bd. 1, 1160.

In explanation of the chronological difficulty, the confusion resulting from the use of *letters* as numerals in Hebrew MSS. has been urged; and this is notoriously a fertile source of error and contradiction, which rationalistic critics have not sufficiently kept in mind. To adduce such a reason, however, would be unavailing in the present case; for if it could be proved that the period stated in E. may have been abbreviated through the negligence of some careless transcriber, or otherwise, and thus an approximation be made to the *fourteen* centuries of Bunsen, this would only place the writer of the Pentateuch in more visible antagonism with St. Paul himself. The date of the exodus is fixed by Usher at 1491 B.C.; by the Septuagint, at 1614 B.C.; by Hales at 1648 B.C.; by Wilkinson, about 1495 B.C., in the reign of Thothmes III.; and by Bunsen, as late as 1320 or 1314 B.C., in the reign of Menephthah, in the latter of which years Manetho gives what appears to be the Egyptian version of the event. The genuineness and authenticity of the book of E. have been sharply criticised in modern times; but in fact, as early as the time of Josephus (*Ant.*, ii. 16), there were Jews who looked upon the miracle of the crossing of the Red sea, etc., as fabulous. Among the theologians

who have questioned the integrity of E., are Von Lengerke, Stähelin, De Wette, Knobel, and Colenso, who find traces of an older and a later author, the former of whom they call Elohist, and the latter Jehovistic. Their objections have been replied to by Hengstenberg, Hävernick, etc., who endeavor to show that the distinction is artificial, and the attempt to follow it out in detail a failure. See PENTATEUCH.

EXOGENY. This term signifies marriage outside the limits of one's family, clan, or nation, and it is opposed to endogamy or intermarriage between those who are closely related. Looked at from a physiological standpoint, it is conceded that exogamy is productive of the best results to the human family, as continued intermarriage weakens the race physically and mentally. The origin of exogamy is traced to the custom of infanticide among the females in early barbaric times, thus creating a scarcity of wives, which led the young men of the tribes to capture the women of neighboring tribes by force. The old Roman legend of the *Rape of the Sabines* is an illustration of this fact. The circumstances most opposed to exogamy are the distinctions of caste (q.v.), totem (q.v.) religion, and policy. See MARRIAGE.

EXOGENOUS PLANTS, or EXOGENS (Gr. *exo*, outwards; *gennao*, to produce), are those in which the woody substance of stem increases by bundles of vascular tissue added externally. The exogenous stem contains a central *pith* (q.v.), from which *medullary rays* proceed to the bark (q.v.), and the bark is very distinct from the fibro-vascular or woody part which it surrounds. The exogenous is thus very different in structure and manner of growth from the endogenous or the acrogenous stem. Amidst the cellular substance of the young stem, when it has developed itself from the seed, woody cords are seen connecting the cotyledons, and afterwards the leaves, when these appear, with the root, in the central axis of which they join. A section of the stem exhibits the cellular substance traversed by vascular bundles (woody fiber), which in the section are more or less wedge-shaped, radiating from the center, but yet not prolonged into the center itself, which, even to the greatest age of the stem, remains occupied by the cellular pith. Additional bundles are interposed, as growth proceeds, diminishing the proportion of cellular substance in the stem, yet without these bundles ever becoming so compacted together as to cut off the communication between the cellular center of the stem and its bark, which is maintained by means of the medullary rays, often, indeed, imperceptible to the naked eye, but always present even in the hardest and most close-grained wood. The woody layers which are formed in successive years, as new leaves and branches are developed, are formed amidst the *cambium* (q.v.), into which the woody fibers of the new leaves descend, between the bark and the former wood. Thus the concentric circles are formed, usually one for each year's growth, distinguishable even in the most matured timber, and by which the age of trees is very commonly computed. The beginning of each new layer is generally marked by a greater abundance of *porous vessels*, the openings of which are conspicuous in the transverse section. In pines, the line of separation between the layers is marked by greater density of texture, and often by deeper color. The age of trees cannot, however, be calculated with perfect certainty from the concentric circles of the stem, as any circumstance which temporarily arrests the growth in any summer, may produce an effect similar to that ordinarily produced by the change of seasons; whilst in the trees of tropical countries, at least where the wet and dry seasons are not very marked, concentric circles are often not to be discovered.

The structure of the branch of an exogenous tree perfectly corresponds with that of the stem. The vascular bundles of the stem or branch form a loop where a leaf begins, and those of the leaf and its axillary bud spring from the loop. The roots of exogenous plants have not a central pith like the stem, but in a few trees, as the horse-chestnut, the pith is prolonged to some extent into the root.

Anomalies are not unfrequently to be met with in the structure of exogenous stems, and particularly among the twining woody plants of tropical countries. There are also very many herbaceous plants, in which, although the structure agrees with that of an exogenous tree in its first year, no further development is ever attained; whilst in many, even this is very imperfectly reached; but yet these are on other accounts unhesitatingly classed with exogenous plants. The exogenous stem and dicotyledonous seed are so constantly found together, that the designation exogenous plants is often applied to that great division of the vegetable kingdom, which is also called dicotyledonous. See BOTANY.

EXORCISM (from *exorkizo*, to conjure), i.e., conjuration in the name of the gods, the term used by the fathers of the church to denote the act of conjuring evil spirits, in the name of God or Christ, to depart out of the person possessed. The first Christians adjured evil spirits in the name of Jesus Christ, who had conquered the devil; but as the opinion was at the same time entertained, that all idolaters belonged to the kingdom of Satan—who suffered himself to be worshiped under the form of idols—it was customary to exorcise heathens previous to their receiving Christian baptism. After Augustine's theory of original sin had found acceptance in the 5th c., and all infants were regarded as belonging to Satan's kingdom, E. became general at the baptism even of Christian children. Following the practice of the Roman Catholic church, Luther retained E., but it was laid aside by the Reformed church. Although abandoned by

illustrious and orthodox Protestant theologians, such as Chemnitz and Gerhard, or deemed unessential, and in modern times done away with by the "Protestant" church, the practice has been recently revived by the Old Lutheran or High-church party.

In the Catholic church, the function of E. belongs peculiarly to one of the so-called "minor orders." See **ORDERS, HOLY**. Our Lord having not only himself in person (Matt. ix. 32, Mark i. 25, Luke iv. 35, viii. 29) cast out devils, but having also given the same power to his disciples, it is believed to be permanent in the church. Of its exercise in the early church, both in relation to "energumens," or persons possessed, and in the administration of baptism, there are numerous examples. Tertullian and Origen speak of it as of ordinary occurrence, and the council of Carthage, in 255, alludes to its use in baptism. The rite of E. is used by the modern church in three different cases: in the case of actual or supposed demoniacal possession, in the administration of baptism, and in the blessing of the chrism or holy oil, and of holy water. Its use in cases of possession is now extremely rare, and in many diseases is prohibited, unless with the special permission of the bishop. In baptism it precedes the ceremony of applying the water and the baptismal form. It is used equally in infant and in adult baptism, and Catholic writers appeal to the earliest examples of the administration of the sacrament as evidence of the use of E. in both alike. The rite of baptismal E. in the Roman Catholic church follows closely the scriptural model in Mark viii. 33. The exorcisms in the blessing of the oil and water resemble very closely the baptismal form, but are more diffuse.

EXOSMOSE. See **ENDOSMOSE**.

EXOSTEMMA, a genus of American trees and shrubs of the natural order *cinchonaceæ*, nearly allied to *cinchona*. Several species yield febrifugal barks, which, however, do not contain the cinchona alkaloids. The most valued of these barks are Caribbee bark (q.v.) and Saint Lucia bark, the latter of which is the produce of *E. floribunda*, a native of the more mountainous parts of the West Indies.

EXOSTOSIS (Gr. *ex*, out of, and *osteon*, bone), a bony tumor growing from some of the osseous structures of the body. See **TUMORS**.

EXOTERIC. See **ESOTERIC**.

EXOTIC PLANTS, or **EXOTICS** (Gr. coming from abroad), cultivated plants originally derived from foreign countries. The term is most frequently applied to those of which the native country differs so much in soil or climate from that into which they have been conveyed, that their cultivation is attended with difficulty, requiring artificial heat or other means different from those requisite in the case of indigenous plants. The cultivation of many such exotics is carried on with great success in our greenhouses and hot-houses; but there are a few which, notwithstanding all the care of the gardener, can almost never be made to flower, and others which, although they flower, seldom produce ripe fruits and seeds. Nor are difficulties of this kind experienced only in the cultivation of those which belong to warmer climates than our own, but sometimes even with the natives of colder regions; thus, the delicious fruit of the *rubus arcticus*, abundant in the most northern parts of Europe, is scarcely ever to be seen in the gardens of Britain, although the plant grows with sufficient luxuriance.

EXPANSION. See **HEAT**.

EXPATRIATION, a voluntary change of residence and allegiance from one's native land to another country and government. Despotie governments have assumed the right to forbid such a change on the part of their citizens, but the United States recognizes the right of the individual citizen, at his own pleasure, to leave the country of his birth and make his home in a foreign land. Naturalization, however, is necessary to the complete transfer of allegiance. The United States defends the rights and liberties of naturalized, precisely as it does those of native citizens. A naturalized citizen of this country, visiting his native land, is protected by the American flag as though he had been born on American soil. Of course, this right of expatriation cannot be made a cover for a previous breach of trust, or the commission of any crime, in the place of one's birth; but the assumption that the law of his native land requiring him at a certain time of his life to do military duty, nullifies for the time being a man's right of expatriation, is not allowed by the United States. Thousands of young men leave the old world for the avowed purpose of avoiding military conscription, and the United States welcomes them to citizenship, with all its rights and obligations.

EXPECTATION (Lat. *expectatio*, a waiting, or looking out), i.e., the treatment of disease without active remedies, by simply observing its progress and averting its consequences through physiological means; as, for instance, when a fracture (q.v.) is treated by keeping the ends of the broken bone in their proper place, until the natural processes of repair are completed. E. is in this and other cases obviously a quite different thing from inaction, or the systematic doing of nothing, with which it has been sometimes confounded.

EXPECTATION OF LIFE. See **PROBABILITY**.

EXPECTATION WEEK is the name given to the period elapsing between Ascension day and Whitsunday, because during this time the apostles continued praying in earnest expectation of the Comforter.

EXPECTORANTS (Lat. *ex*, out of, and *pectus*, the breast), medicines given to carry off the secretions of the air-tubes. See BRONCHI, BRONCHITIS. The principal E. are antimony, squill, ipecacuanha, senega, balsam of tolu, lobelia, gum ammoniac, asa-fœtida, galbanum, etc.

EXPECTORATION (see EXPECTORANTS), the mucus or other secretion discharged from the air-passages. The examination of E. is of the utmost value in the diagnosis of diseases of the chest, as will be seen in their separate description. See CHEST, BRONCHITIS, PNEUMONIA, CONSUMPTION, etc.

EX PEDE HERCULEM. (Latin proverb.) "You can judge of Hercules from his foot" meaning that the whole can be tested by a part. The saying is assigned to Pythagoras, and is paralleled by another similar phrase, *ex ungue leonem*, "You can judge of a lion by his claw."

EXPEDITATION is the cutting off of the claws or the ball of the forefeet of a dog, to prevent his running after deer.

EXPENSE MAGAZINE. A military term used of the immediate store of ammunition for the batteries of a siege, and formed under the parapet.

EXPENSES or COSTS of a LAWSUIT. The arrangements adopted in England with reference to charges exigible from the parties to lawsuits are stated under COSTS. In the United States of America, the statutes generally provide that the successful party shall be reimbursed for disbursements made for certain necessary objects, as, e.g., clerk's fees, etc. There are allowed besides these disbursements certain sums of money called costs, strictly speaking. The law does not recognize, however, any claim of the successful party against the other for money expended for attorney's and counsel's fees. Doubtless it was originally intended that the statutory costs should help towards this end, but as a matter of fact costs are generally regarded as a sort of honorarium to which the successful attorney is entitled.

EXPERIENCE MEETING. A name applied to religious gatherings at which one or more of those present set forth their spiritual history and experiences. In the Methodist church they are called class-meetings, and among some other denominations covenant or conference meetings. The ordinary prayer-meeting of a church sometimes takes this form. Much criticism has been made of this kind of public confession, as tending to foster self-pride and to lead its participants into saying more than is strictly true, but those who defend the custom quote in its favor such Bible verses as Mal. iii. 16; Col. iii. 16, and claim that it has a most edifying and strengthening effect.

EXPERIENTIA DOCET. (Latin.) Experience teaches; i.e., one must learn by experience.

EXPERIENTIALISM is the doctrine that experience is the foundation of all knowledge, and that all primary beliefs—personal identity, uniformity of nature, etc.—are only generalizations from one's own experience and that of others. Thus Experientialism is a somewhat less extreme form of DETERMINISM (q.v.), and is opposed to Intuitionism, which claims that primary beliefs are instinctive, naturally implanted, and spontaneously developed.

EXPERIMENT and observation are the means by which we extend and confirm our knowledge of nature. An E. is properly a proceeding by which the inquirer interferes with the usual course of a phenomenon, and makes the powers of nature act under conditions that, without his interference, would never, perhaps, have presented themselves all together. The introduction of E. distinguishes the modern method of investigating nature from that of ancient times and of the middle ages. It is by this means that physics and chemistry have made such rapid strides within the last two centuries. Through E., the investigator becomes master of the phenomena he is considering; for he can contrive to set aside the unessential circumstances that so often conceal the real relations and conditions of things, and make these come out into the light. Experiments exhibited during a lecture on any branch of science are made, not with a view to the discovery of truth, but to aid in the exposition of truths already discovered; they are sometimes called demonstrative experiments.

EXPERIMENTALISM. See EXPERIENTIALISM.

EXPERIMENT MILLS is a small village in Monroe Co., Pennsylvania, about two miles from Delaware Water Gap. It is becoming something of a summer resort.

EXPERIMENTUM CRUCIS. A crucial test. The name is employed, according to Bacon, because, like a cross (*crux*), it shows men which of two ways they are to follow.

EXPERT (Lat. *expertus*, from *ex* and *peritus*, specially skilled), a man of special practical experience or education in regard to a particular subject—a word commonly applied (after the French) to medical or scientific witnesses in a court of justice, when selected on account of special qualifications, as in the case of an analysis of the con-

tents of the stomach in suspected poisoning. The term is similarly applied to a person professionally skilled in hand-writing, for detection of forgery of deeds and signatures.

EXPIATION OR **ATONEMENT**, DAY OF, among the Jews, is the 10th day of the month Tisri (corresponding to a part of our Sept. and Oct.), observed annually as a day of humiliation and atonement for national sin: the only day of national humiliation which Moses prescribed. The commandment to observe it was three times solemnly given, and the religious ceremonies peculiar to it were definitely ordained. All the people were required to refrain from work as strictly as on the Sabbath, and to afflict their souls in remembrance of their sins. In this humiliation fasting was probably designed to be included, and has been strictly practiced. The chief significance of the observance, as also its heaviest burden, centered in the high-priest as the representative of the nation before God. 1. The seven previous days were spent by him in nearly total separation from all other persons, and in careful preparation for his special duties. 2. "During the whole of the seven days, as well as on the day of atonement" (according to the statements of the rabbins) "the high-priest had to perform the ordinary sacerdotal duties of the daily service himself." 3. It was the only day of the year in which even he was allowed to enter the most holy place. 4. He was clothed in the linen priestly vestments instead of the splendid robes which at other times distinguished him. 4. He offered sacrifice first for himself and his house, sprinkling the blood and burning incense before the mercy-seat. 5. He took two goats for the sin-offering in behalf of the people, presenting both before the tabernacle, and having cast lots to determine which one should die, sacrificed it on the altar and carried its blood within the veil; then having confessed over the head of the living goat all the sins of the people, he sent it away under the charge of a trusted man to be set free in an uninhabited part of the wilderness. By this double offering as parts of one sacrifice the two great facts of redemption were represented: 1st, that an atonement for sin was made to God; and 2d, that the burden of sin was removed from man. In modern times the Jews continue to observe the day, beginning the ceremonies with what can be regarded at best, as only a mournful parody on the offering of the scape-goat, fasting strictly through the day, and closing the service by reading the Scripture command for sacrifices which they can no longer bring.

EXPLOITS, RIVER OF, one of the largest rivers in Newfoundland, rising in the s.w. part of the island and running n.e. to the bay of Exploits, into which it falls about 49° n. and 52° w. Steamers go up 12 m., and small boats can pass to within 50 m. of the s.w. coast. The valley is fertile and abounds in game, being sparsely settled as yet, and the river is bountifully supplied with fish.

EXPLOSIVES. There is a question as to the influence, direct or indirect, upon modern civilization of the introduction of explosive agents for the purpose of war. Some eminent authors have gone so far as to consider the invention of gunpowder as next in importance, in its ultimate effects, to those of printing and the application of steam power. However this may be, it is well to remember that explosive substances are now of immense utility in the arts of peace; indeed, it is not too much to say that without their aid many of the great engineering enterprises of the present day would either be impossible, or else have to be carried out at a vast additional expenditure of time and labor. The germ of all the knowledge which we possess of explosive reaction undoubtedly lay in the probably accidental discovery, many ages ago, of the deflagrating properties of the natural substance niter or saltpeter, KNO_3 , when in contact with incandescent charcoal. By distilling niter with oil of vitriol, the alchemists obtained a corrosive fluid which they called *aqua fortis*, now known as nitric acid, HNO_3 , which parts with its oxygen even more rapidly than saltpeter; so that if the strongest nitric acid be poured upon finely powdered charcoal, the latter takes fire at the ordinary temperature. Somewhat less than half a century back, it was discovered by some French chemists that upon treating various organic substances, such as starch, the sugars, cotton fabrics, and even paper, with concentrated nitric acid under proper precautions, the chemical constitution of the substances underwent a great change, and they became endowed with violently explosive properties, while remaining for the most part unaltered in external characteristics. To this discovery we owe a distinct class of explosive compounds, the most powerful for practical purposes as yet known.

Examining into those principles of constitution and action which are more or less common to all explosive substances, we may define, for our purpose, the term "explosive" as the sudden or extremely rapid conversion of a solid or liquid body of small bulk into gas or vapor, occupying very many times the volume of the original substance, and, in addition, highly expanded by the heat generated during the transformation. This sudden or very rapid expansion of volume is attended by an exhibition of force, more or less violent according to the constitution of the original substance and the circumstances of explosion. Any substance capable of undergoing such a change upon the application of heat, or other disturbing cause, is called "explosive." The most explosive substances that are practically the most important essentially contain carbon, oxygen, and nitrogen, the last always existing in a state of feeble combination with the whole or part of the oxygen, and thus creating that condition of unstable chemical equilibrium which is necessary. When explosion takes place, the nitrogen parts with

its oxygen to the carbon, for which it has a greater affinity, forming carbonic acid (CO_2) and carbonic oxide (CO) gases, the combination being accompanied with great generation of heat, and the nitrogen is set free. In most explosives there is also hydrogen accompanying the carbon, and by its combustion producing an extremely high temperature; it combines with part of the oxygen to form water in the form of greatly expanded vapor. Other subordinate elements are often present; in gunpowder, for instance, the potassium binds the nitrogen and oxygen loosely together in the state of saltpeter, and there is sulphur, a second combustible, whose oxidation evolves greater heat than that of carbon. When chlorate of potash is present, the chlorine plays the part of nitrogen, and is set free in the gaseous state. Two very unstable and practically useless explosive substances, the so-called chloride and iodide of nitrogen, contain neither carbon nor oxygen; but their great violence is equally caused by the feeble affinities of nitrogen for other elements, large volumes of gaseous matter being suddenly disengaged from a very small quantity of a liquid and solid body respectively.

Explosives may be conveniently divided into two distinct classes—(1) explosive mixtures, and (2) explosive compounds. The first class consists of those explosive substances which are merely intimate mechanical mixtures of certain ingredients, and which can be again separated more or less completely by mechanical means, not involving chemical action. These ingredients do not, as a rule, possess explosive properties in their separate condition. There are, however, explosives which might almost be classed in both categories; for example, *picric powder* is composed of ammonium picrate and saltpeter, the former of which contains an explosive molecule, but is mixed with the latter to supply additional oxygen, and thus increase the force. If a substance that will burn freely in air, combining gradually with the oxygen of the atmosphere, be ignited in pure oxygen gas, the combustion will be much more rapid, and the amount of heat generated greater, at the ordinary atmospheric pressure. If it be possible to burn the substance in a very condensed atmosphere of oxygen, we can readily imagine the combustion as very greatly accelerated, and therefore increased in violence; this is what is ordinarily effected by an explosive "mixture." A combustible body and a supporter of combustion are brought into extremely close contact with one another by means of intimate mechanical mixture; also, the supporter of combustion, or oxidizing agent, is present in very concentrated form, constituting what may be termed a magazine of condensed oxygen, solid or liquid. In the case of the explosion of a definite chemical compound, the change may be considered as the resolution of a complex body into simpler forms. This is not, however, always the case when a mechanical mixture is concerned; gunpowder, for example, may be said to contain two elementary substances, carbon and sulphur, not in chemical union.

The chief explosive mixtures may be subdivided into "nitrate mixtures" and "chlorate mixtures." In the nitrates, the oxygen is held in combination with sufficient force to need a powerful disturbing cause to separate it, so that mixtures made from nitrates do not explode very rapidly, and their action is comparatively gradual; they are not sensitive to friction or percussion, and hence are to a great extent safe. Any of the nitrates will form explosive mixtures with combustible substances, but nitrate of potash, KNO_3 , is the only one practically employed. The nitrate of soda, called "cubical" or Chili saltpeter, has been used, but absorbs moisture from the air so readily as to give very inferior results. Gunpowder may be taken as the representative of the nitrate explosive mixtures. Picric powder, above referred to, has been proposed by Abel for use as a bursting charge for shells, as being more powerful than a corresponding charge of gunpowder, equally safe as regards friction or percussion, and less hygroscopic; it consists of two parts ammonium picrate, and three parts saltpeter, incorporated, pressed, and finished very much as ordinary gunpowder.

The chlorates part with their oxygen far more readily than the nitrates, the strong affinities of chlorine for the metals coming into play, and consequently chlorate mixtures are very sensitive to friction and percussion, and explode with great violence; chlorate of potash, KClO_3 , is the only one used. Very many chlorate mixtures have been made, some of which are employed in fireworks. "White gunpowder" is a mixture of two parts chlorate of potash, one of yellow prussiate of potash, and one of sugar; it is exploded very easily by friction or percussion. The most important chlorate mixtures are those used for igniting other explosives, such as the composition for friction tubes for firing cannon, percussion-cap composition, and percussion fuses for bursting shells on impact; it is sometimes mixed with sulphur, as a combustible, and sometimes with black sulphide of antimony, which gives a longer flame.

In an explosive "compound," the elements are all in chemical combination, presenting a definite explosive "molecule," which contains, so to speak, both the combustible and the supporter of combustion, in the closest possible union; we can therefore understand its action being much more sudden and violent than that of the most intimate mechanical mixture. The chief explosive compounds are formed from some organic substance containing carbon, hydrogen, and oxygen, by introducing into it, through the action of concentrated nitric acid, a certain portion of nitric peroxide NO_2 , in substitution for an equivalent amount of hydrogen. A new compound, differing outwardly very little, if at all, from the original substance, is thus formed, but in a very unstable state of chemical equilibrium, because of the feeble union of the nitrogen

and oxygen in the NO_2 molecule. A slight disturbing cause brings into play the stronger affinity of the carbon and hydrogen for the large store of oxygen contained in the new compound. Gun-cotton and nitro-glycerine are the leading members of this group, being produced in a precisely similar manner, by the substitution of three molecules of NO_2 for three atoms of hydrogen (H). As those explosives will be elsewhere described in detail, we give the formation, as a representative member of the group, of nitro-phenol, or picric acid, by treating phenol, or carboic acid, with a mixture of nitric and sulphuric acids, the latter being required to absorb the water and preserve the full strength of the nitric acid:



The formula of the product may be empirically written $\text{C}_6\text{H}_3\text{N}_3\text{O}_7$; it is, like gun-cotton and nitro-glycerine, a *tri-nitro* substitution product. Only the picrates, or salts of picric acid formed with potassium or ammonium, are used in practice, as possessing more force than the uncombined acid. From starch may be obtained, in a strictly analogous manner, an explosive called *xyloidine*, which is a *bi-nitro* product, two molecules of nitric peroxide being substituted for two atoms of hydrogen. In the case of *nitro-mannite*, an explosive made from mannite, one of the sugars, as many as six molecules of the NO_2 are inserted. The number of nitro-substitution products is very great, many of them being more or less violently explosive. The fulminates are among the most violent of all explosive compounds, their chemical sensibility being very small. Sudden in action, their effect is great locally; thus they are well adapted to the purpose, for which alone they are practically used, of igniting or upsetting the equilibrium of other explosives. Fulminate of mercury is produced by adding alcohol ($\text{C}_2\text{H}_6\text{O}$), under great precautions, to a solution of mercury in nitric acid; a gray crystalline precipitate is obtained, very heavy (sp. gr. 4.4), and so sensitive to friction or percussion that it is kept in the wet state. The results of analysis show one atom of mercury, and two each of carbon, nitrogen, and oxygen; so that the formula may be empirically written $\text{HgC}_2\text{N}_2\text{O}_2$, or perhaps more correctly $\text{HgO.C}_2\text{N}_2\text{O}$; the chemical factor $\text{C}_2\text{N}_2\text{O}$ is called *fulminic acid*, but has never been produced separately. Opinions differ as to the precise "rational" formulæ of the fulminates, some chemists considering their process of formation to be similar to that of the nitro-substitution products. It will be observed that two atoms of nitrogen take the place of hydrogen, being the ratio of combining proportions of those elements. The products of combustion are carbonic oxide, nitrogen, and metallic mercury, and the violence of action is due to the sudden evolution of a volume of gas and vapor very large in comparison with that of the substance, its density being so great. This fulminate enters into the composition used for percussion caps and electric fuses; its practical value has of late years been immensely increased by the discovery of its power, even in very small quantities, to produce the almost instantaneous decomposition of several explosive substances. Fulminate of silver is prepared in a similar manner, but, being far more sensitive, is of little practical value; it is employed, in very minute quantities, in making such toys as detonating crackers.

It may be generally concluded that the amount of force exerted by an explosive substance depends upon (1) the *volume of gas or vapor* produced by the transformation, compared with that of the original substance; and (2) the *temperature of explosion*, which determines the extent to which the gases are expanded, or their tension increased; or, in other words, the explosive force is directly proportional to the heat of combustion, and the volume of gas and vapor calculated at 0°C . and 7.60 mm. pressure, and *inversely* proportional to the specific heat of the mixed products. It has been supposed by Berthelot and others that the volume of gas produced may possibly be still further increased by the partial or total "dissociation" of the compound gases, at the high temperatures concerned; for example, that the carbonic acid (CO_2) may be decomposed into carbonic oxide (CO) and oxygen, or the aqueous vapor into oxygen and hydrogen. However, Nobel and Abel demonstrate that, in the former instance, the loss of temperature, consequent upon the absorption of heat by the decomposition, would more than compensate for the increase of volume by dissociation. It must also be remembered that, if the temperature be extremely high, so also is the pressure under which dissociation must take place. We may therefore consider that it has no sensible influence upon the explosive force.

It is most important to distinguish between explosive force and explosive effect, the latter in great measure depending upon the rapidity with which the metamorphosis takes place, while the same amount of force may be exerted suddenly or gradually. We may, therefore, consider that the explosive effect varies *directly* as the volume of gas produced and the temperature of explosion, and *inversely* as the time required for the transformation. But the time, and, to a certain extent, the products and temperature, will vary with (a) the physical state of the explosive substance; (b) the external conditions under which it is fired; (c) the mode of firing or exploding.

The physical or mechanical state of the explosive substance has a most important bearing upon the effect obtained from it. To prove this, it is only necessary to point to the very different results given by gunpowders made with the same proportions of the three ingredients, but varying in density, and in shape and size of grains or pieces.

Gun-cotton is even more affected by variations in mechanical condition. In the form of loose wool, it burns so rapidly that gunpowder in contact with it is not inflamed; plaited or twisted tightly, its rate of combustion in air is greatly modified. This is due to the fact that the inflammable carbonic oxide, which is evolved by the decomposition from the want of sufficient stored-up oxygen to oxidize completely all the carbon of the gun-cotton, cannot penetrate between the fibers and accelerate the combustion, but burns with a bright flame away from the surface of the twisted cotton: when the yarn is yet more compressed by any means, the temperature is not kept up to the height necessary for the combustion of the carbonic oxide, so that it escapes unconsumed, abstracting heat, and yet more retarding the rate of burning. For the same reason, pulped and compressed gun-cotton burns comparatively slowly in air, even when dry; in the wet state, it merely smolders away, as the portion in contact with the fire successively becomes dried. Yet this same wet compressed gun-cotton can be so used as to constitute one of the most powerful explosives known.

It is well known that gunpowder behaves differently when in the open air and under strong confinement; not only the rate of burning, but even, to a certain extent, the products of combustion are altered. We have discussed the effect of tightly plaiting or compressing gun-cotton; but when confined in a strong envelope, the whole of the inflamed gas, being unable to escape outwards, is forced into the interstices under immense pressure, and the decomposition is greatly accelerated. The amount of confinement or restraint needed by any explosive depends, however, upon the nature of the substance and the mode of exploding it, becoming very much less as the transformation is more rapid, until it may be said to reach the vanishing-point. For example, the very violent explosive chloride of nitrogen is usually surrounded, when exploded, with a thin film of water. Abel states that if this film, not exceeding $\frac{1}{1000}$ in thickness, be removed, the explosive effect is much lessened. Nitro-glycerine, again, when detonated by a fulminate, is sufficiently confined by the surrounding atmosphere. By the same means, gun-cotton may be exploded unconfined, if compressed, the mechanical cohesion affording sufficient restraint. In the case of wet compressed gun-cotton, which can be detonated with even fuller effect than dry, the mechanical resistance is greater, the air-spaces being filled with incompressible fluid.

The manner in which the explosion is brought about has a most important bearing upon the effect produced. This may be done by the direct application of an ignited or heated body, by the use of an electric current to heat a fine platinum wire, or by means of percussion, concussion, or friction, converting mechanical energy into heat. A small quantity of a subsidiary explosive, such as a composition sensitive to friction or percussion, is often employed, for the sake of convenience, to ignite the main charge, the combustion spreading through the mass with more or less rapidity, according to the nature of the substance. See EXPLOSIVES OF HIGH POWER.

EXPLOSIVES OF HIGH POWER. For over four hundred years the science of explosives remained in *statu quo*. In 1328 Berthold Schwartz, of Freiberg, is credited with the invention of gunpowder, although many records are in existence which indicate that prior to that date the Arabs knew the use of an explosive mixture, which they called *Medfoa*. This consisted of 10 drachms of saltpetre, 2 drachms of charcoal, and $\frac{1}{2}$ drachms of sulphur; and it is noteworthy that these proportions closely resemble those of the present formula of English gunpowder—namely, 74.07 saltpetre, 14.82 charcoal, and 11.11 sulphur. The first advance leading to the introduction of modern high explosives was made in 1832, by the French chemist Barconnet, of Nancy, who discovered that “when starch fibres and analogous substances are acted upon by concentrated nitric acid, they are changed into highly combustible materials.” In 1838 Pelouze continued these researches, and he ascertained that this new inflammable material, which he called xyloidine, took fire at 180° C., when submitted to strong pressure, such as a rapid blow. He also found that cotton, paper, and, indeed, all vegetable matters could be employed in the preparation of similar substances. All these researches, however, were without any practical value until Schönbein, of Bale, in 1845, devised methods for the manufacture of a new explosive on a commercial scale, by treating gun-cotton with a mixture of nitric and sulphuric acids. In 1847 Sobrero, an Italian chemist, discovered in Pelouze's laboratory, in Paris, the explosive properties of nitro-glycerine, but the discovery was without practical application until 1860, when the Swedish engineer, Alfred Nobel, devised methods for the manufacture of the substance on a large scale, and also succeeded in exploding it with certainty when under confinement. He patented it under the name of Nobel's Blasting Oil, and subsequently he found a ready means of absorbing the oil in porous substances, thereby producing the now famous dynamite, or giant powder. From this time the progress of explosives has been remarkably rapid; the ablest chemists and the best engineers have found in the study of explosives a fruitful field. Their rapidly extending use for the removal of masses of rock has directed attention to their nature and mode of action, and has also led to numerous attempts to increase their effectiveness, to modify their action to suit their different uses, and to reduce their danger. Every miner knows the importance of having as much as possible of the charge at the bottom of the bore-hole; it is there that the maximum amount of work is exerted; and as the explosives contain the stored-up energy in a smaller volume than the ordinary blast powder, they allow of concentration of

the charge nearer the bottom of the bore-hole. The downward force exerted by explosives is of greatest benefit in mining operations. The substitution of sodium nitrate and barium nitrate for saltpetre was tried more or less successfully, but the chief direction which attempts to produce useful powder substitutes has taken is that of applying the comparatively violent oxidizing properties of potassium chlorate. Among those preparations that are best known are the modifications of the original white or German gunpowder—that is, mixtures of sugar and prussiates of potassium with the chlorate, or preparations consisting of mixtures of tannin, powdered nut-galls, or cream of tartar with the oxidizing agent. Exceedingly crude mixtures of spent tan or sawdust, with saltpetre or other oxidizing salts, together with a little sulphur, have been devised apparently rather with a view to comparative safety than to compete in effects with gunpowder. Picric acid in the form of the potassium and ammonium compounds, mixed with oxidizing salts, has been made the basis of powerful explosive agents, and lately melinite (q.v.), which is a picrate compound, has been adopted by the French. The potassium salt, when intimately mixed with the chlorate, furnishes a product which in susceptibility to detonation and violence of action more nearly resembles nitro-glycerine and gun-cotton than any explosive mixture composed of solid substances, but hitherto it has not been made applicable to practical uses on account of the great readiness with which it is exploded by friction and percussion. M. Designolle made a compound of salt mixed with charcoal, saltpetre, and potassium chlorate from which some favorable results were obtained in France; but much greater satisfaction was had from a mixture of sir Frederick Abel's composed of an equivalent portion of ammonium picrate and saltpetre. Nitro-glycerine, upon which so many of the high explosives depend, is manufactured at various places and by various processes, and at ordinary temperatures is an oily liquid, clear, colorless, or yellowish, refracting light, of sweetish and burning taste, without odor, and of 1.6 specific gravity. It produces serious consequences when taken in the human system, causing vertigo, weakening of sight, stupor, pains in the cardiac region; in larger doses it acts like strychnine, being fatal when more than 10 grains are swallowed. Even mere contact with the skin produces serious symptoms, though workmen get used to it after a time. It does not, when pure, decompose spontaneously at ordinary temperatures, but at high temperatures nitrous acid vapors are disengaged. It may be gradually heated to 100° C., but becomes very sensitive to slight shocks. Putting a light directly to nitro-glycerine does not lead necessarily to detonation. Poured out in a thin layer, the liquid burns away like gunpowder. It is only on being heated in a closed space that its entire mass explodes, when the temperature reaches 257°. Such a heating can be effected by the electric spark. A sudden blow will do it, though it detonates only that portion with which it came in contact. The explosion produced in the part that had been directly exposed to the blow will not communicate itself to the rest of the nitro-glycerine, unless in a solid condition. The detonation of gunpowder, gun-cotton, or fulminate causes nitro-glycerine to explode, whether it is loose or under confinement. *Nitro-gelatine* is the name given to nitro-glycerine solidified by means of gun-cotton collodion. This is more insensible to shock, to friction, and to the pressure or action of water than nitro-glycerine, and a peculiarly powerful detonator must be used with it. Camphor is generally added to render nitro-gelatine insensible to blows, even to projectiles at short range. When thus treated it becomes the *gelatine explosive de guerre*, which is largely employed by various governments for military engineering purposes. *Dynamite* consists of nitro-glycerine absorbed in a porous substance, particularly the infusorial earth called "kieselguhr," which absorbs three or four times its own weight of nitro-glycerine, and possesses the advantage over other absorbents of resisting a greater degree of pressure without parting with any of the nitro-glycerine which it holds. The saturation of the infusorial earth with the nitro-glycerine takes place in the same building in which the liquid is finally washed. In about half an hour the mixture is completed; the mass is now pressed by hand through sieves, and is ready for being filled in cartridges. The cartridges are of cardboard paper or of vegetable parchment; their mode of filling is very simple, and is usually done by hand. *Colonia* and *Hercules* dynamite are mealled gunpowder mixed with about 35 per cent. of nitro-glycerine, and resemble the first nitro-glycerine made in 1863. *Vulcan* is also a dynamite composed of mealled gunpowder holding 43 per cent. of nitro-glycerine. *Seranine* and *Horseley's Powder* are chlorate of potash preparations mixed with nitro-glycerine. The substitution of a chlorate for a nitrate is said not to add to the power, while it adds to the expense of the compound, and also somewhat increases the danger. *Dualine* consists of sawdust, nitrate of potash, and nitro-glycerine. *Lithofractem* is 55 per cent. nitro-glycerine, 21 per cent. kieselguhr, 6 per cent. charcoal, 3 per cent. sulphur and manganese oxide, or either of them, and 15 per cent. barium nitrate and bicarbonate of soda. *Ammonia Powder* consists of 80 parts by weight of nitrate of ammonium, 6 parts of charcoal, and 14 to 20 of nitro-glycerine. *Giant Powder* consists of 40 per cent. of nitro-glycerine added to a mixture of 40 parts nitrate of soda or potash, 6 parts resin, 6 parts sulphur, and 8 parts infusorial earth. Other nitrates and other carbonaceous substances may be substituted for these. *Sebastin* contains a prepared charcoal (made of hazel-wood or elder) which absorbs between five and six times its weight of nitro-glycerine. *Brain's Powder* contains chlorate in the place of nitrate of potash, and, as an absorbent, coal dust, sugar, starch,

or any carbonaceous material. *Rhenish Dynamite* is composed of a solution of 2 to 3 per cent. of naphthaline in nitro-glycerine, 3 parts of chalk, 7 parts of heavy spar, and 20 parts of purified infusorial earth. *Forcite* is a mixture of nitro-glycerine with cellulose, the latter being gelatinized by heating in water under considerable pressure, but nitrated cellulose is also used in admixture with oxidizing salts. *Atlas Powder* is a form of dynamite which has a rather unenviable reputation in England, due to its having been the explosive used in the outrages which were committed in London a few years ago by the so-called dynamiters, and is a composition of nitro-glycerine, wood fibre and nitrate of soda, with 2 or 3 per cent. of carbonate of magnesia. Seven grades of it are made, containing from 20 to 75 per cent. of nitro-glycerine. They are lignum dynamites. *Gelatine dynamite* consists of a thin blasting gelatine mixed with other substances, such as nitrate of potash and wood meal. There are two grades manufactured in England, one containing 80 and the other 60 per cent. of nitro-glycerine. The great advantage of the plastic dynamites, like gelatine dynamite, forcite, etc., is that they can remain in water without being affected or losing their strength. *Glukodine* is a whitish liquid produced by the nitration of a saturated solution of cane sugar in glycerine. Free sugar dissolves in it, and it is soluble in either. Two kinds of glukodine powder are made, white and black. *American Hercules Powder* is of the following composition :

| | No. 1. | No. 2. |
|----------------------------|--------|--------|
| Carbonate of magnesia..... | 20.85 | 10.00 |
| Nitrate of potash..... | 2.10 | 31.00 |
| Chlorate of potash..... | 1.05 | 3.34 |
| White sugar..... | 1.00 | 15.66 |
| Nitro-glycerine..... | 75.00 | 40.00 |

The miners speak very favorably of it, claiming that the fumes are not so bad as from other dynamites. The reason for this is ascribed to the presence of the alkaline absorbent, which, in exploding, gives off explosion gases in which no carbonic oxide is present, and possibly the nitrogen also may enter into combinations which do not affect the organism. *Judson Powder* is made on the principle of rendering the oxidizing salts (nitrates) non-absorbent, and also non-hygroscopic. To the "dope," so prepared 10 per cent. of coarsely ground arthractite is added, and to this mixture 5 or 6 per cent. of nitro-glycerine is added, forming a coating or film over the granules, which renders the dope explosive. *Paleine*, or *Straw Dynamite*, is a mixture of nitro-cellulose, made from straw, with nitro-glycerine ; it is made in Sardinia and Belgium. *Travetle's Dynamite* consists of 75 parts nitro-glycerine, 25 parts gun-cotton and 2 parts charcoal. *Carbo-dynamite* has a base of nitro-glycerine, the absorbent being carbon. *Smolianinoff Explosive* consists of 80 per cent. of nitro-glycerine combined with a certain fluid the nature of which is a secret. *Snyder Explosive* consists of 94 per cent. of nitro-glycerine and 6 per cent. of a compound of collodion, gun-cotton, camphor and ether ; and it is exploded by mere concussion against any hard body. *Von Dahmen's Safety Dynamite* is the discovery of a German chemist, who claims that he has found a means of preventing nitro-glycerine compounds from being affected by a low temperature, as already at 40° F. a congelation of the oil takes place, and of rendering all classes and grades of dynamite non-sensitive to the initial explosion of the detonators, thus dispensing with the troublesome and dangerous operation of thawing. From this enumeration of the many dynamite compounds, it will be noticed that in nearly all of them the nitro-glycerine is mixed with or absorbed by an active base, or dope, and for this reason the dynamites are frequently divided into two groups—dynamites with an inert base, such as kieselguhr, which acts merely as an absorbent for the liquid nitro-glycerine, and dynamites with an active—i.e., a combustible or explosive base. A subdivision of the latter is sometimes made in those having as a base charcoal, gunpowder, or other nitrate or chlorate mixtures, and gun-cotton, or other nitro-compounds.

The first attempts to apply gun-cotton in small arms soon after its discovery, in 1846, were disastrous in their results, and the success which, long afterward, was believed to have been achieved by Von Lentis's indefatigable labors in this direction, was not confirmed by experience. Some of the methods of reducing the rapidity and increasing the action of gun-cotton in small arms consist in the uniform dilution of the gun-cotton either with ordinary cotton, or with the less explosive varieties of the material, and tolerably efficient cartridges for small arms have been furnished for sporting purposes ; but the only direction in which substantial prospect of success has hitherto attended the employment of gun-cotton in arms of precision has been that of converting the very finely divided substance into pellets, or grains, of which the rapidity of explosion has been retarded by their uniform impregnation with small quantities of some perfectly inert material, each particle of gun-cotton being enveloped and separated from those surrounding it by a film of non-explosive substance (such a paraffine, stearine, or caoutchouc). Von Lenk's persevering efforts to improve the manufacture and devise methods of application of gun-cotton, though in themselves not crowned with any permanent success, have contributed considerably to secure an unassailable position for that material as a valuable and safe explosive agent, by leading to its systematic study and the consequent development of its manufacture, and the discovery of its most valuable properties. (See article on GUN-COTTON, ITS MANUFACTURE, ETC.) Sir Frederick Abel

conducted some valuable and interesting experiments illustrative of the force of the detonation of gun-cotton in water, and found that if only a small piece from 0.25 to 1 ounce of compressed gun-cotton be exploded by means of a detonator, in the interior of a shell which is filled up completely with water and closed, the force developed is so suddenly and uniformly transmitted in all directions that the sphere, or cylinder, is broken up into a very much larger number of fragments than is produced by filling the shell with gunpowder or a more violent explosive agent. It has also been proved, by small and large experiments, that the explosion of a substance may be brought about as a phenomenon distinct from that of its detonation, in regard both to the conditions to be fulfilled by its development and the mechanical effects produced by it. The combustion products of gun-cotton *in vacuo* are carbonic oxide, steam and nitrogen; in the open air the same gases, with a nitro-acid and cyanogen. One pound of gun-cotton gives in combustion about 22,165 cub. in. of gas, and produces the effect of from 4 to 6 pounds of gunpowder. The chemical constituents of the gases evolved on combustion are, according to Károlyi (in percentage of volume):

| | In vacuo. | Under high pressure. |
|-----------------------|-----------|----------------------|
| Carbonic oxide..... | 28.55 | 28.95 |
| Carbonic acid..... | 19.11 | 20.82 |
| Fire-damp..... | 11.17 | 7.24 |
| Nitrous oxide..... | 8.83 | ..... |
| Nitrogen..... | 8.56 | 12.67 |
| Steam..... | 21.93 | 25.34 |
| Hydrogen..... | ..... | 3.16 |
| Carbon in excess..... | 1.85 | 1.82 |

If the combustion takes place under high pressure, the nitrous oxide entirely disappears from among the explosion gases, and in its place is formed a greater proportion of carbonic oxide, carbonic acid, steam and nitrogen. Spontaneous combustion begins with the evolution of the gases (for example, gas of a nitro-acid); the gun-cotton gradually diminishes in volume, and the residue contains small portions of a nitrogenous substance, traces of formic acid and acetic acid, also sugar, oxalic acid, and so-called gums. This decomposition appears to take place only when the cotton has not been sufficiently freed from fats, and the gun-cotton has not been completely disacidized. *Pyroxyline* is a term used to designate all nitro-compounds resulting from the action of concentrated nitric acid on cellulose, or wood-fibre—as, for instance, cotton, paper, sawdust, straw, etc. *Schultze's Gunpowder* is practically a nitrated, purified, and pulped wood-fibre formed into grains. *Lannoy's White Powder* is wood, or sawdust, nitrated by treatment with strong nitric acid, and 22 parts of the resulting nitro-cellulose are mixed with 65 parts of sodium nitrate and 13 parts of sulphur. *Uchatin's White Powder* is made of starch of a composition similar to that of cellulose, and can also, by treatment with strong nitric acid, be converted into an explosive nitro-compound called *nitro-starch*. It is too strong and rending in its effects for firearms. Nitro-compounds also result from the action of nitric acid on the various kinds of sugar. Thus there is known a *nitro-raw-sugar*, with an alcoholic solution of which it was proposed to coat ordinary gunpowder, in order to render it impervious to water, and also to increase its explosiveness. A *Nitro-milk-sugar* is also known as *nitro-lachus*. *Nitro-mannite* is obtained from the action of nitro-sulphuric acid on the species of sugar of the mannites, found widely distributed throughout the vegetable kingdom, but principally found in the manna ash. In a pure state it exists in snow-white, needle-shaped crystals, soluble in hot alcohol and in ether. It is an extremely explosive substance, approaching in this respect fulminate of mercury, although not so sensitive to heat or friction. *Johnson's Powders*. In these dinitro-cellulose or lower forms of nitro-cellulose are employed, impregnated with barium or potassium, and incorporated with charcoal or other carbonaceous material. *Punshon's Gun-cotton* was coated, covered, or incorporated with sugar, either raw or refined, in such a manner as to separate or isolate the particles or fibres of the gun-cotton, and thus regulate the rapidity of the combustion. He also added nitre. *Totten's Gunpowder* consists of grains, the kernel of which is pure gun-cotton. It is lighter than ordinary powder, and is four and a half times more effective. *Tontine* consists of finely divided or macerated gun-cotton, compounded with about the same weight of nitrate of baryta. The *white* is used for blasting hard stone, such as quartz, and where the object is to smash up as much as possible locally. The *black* is for softer stone, such as limestone, in quarries, where large blocks of building material are extracted. *Collodion-cotton* is a variety of nitrated cotton which has attained greater importance than gun-cotton itself through its diversity of employment—for instance, in photography, for the preparation of the exposed plate; in blasting, for the production of explosive gelatine from nitro-glycerine; in surgery, for uniting the edges of wounds, and in the manufacture of *Celluloid*. It is really different from gun-cotton in its chemical nature, although the same raw materials serve for the production of both. Gun-cotton is extremely explosive, while collodion-cotton is very slightly so; the former is insoluble in alcoholic ether, while the latter is soluble in that menstruum. Ménard and Flores Domonte were the first to obtain a gun-cotton soluble in alcoholic ether. Béchamp investigated it, and found it to

be dinitro-cellulose. It was soon found that not all gun-cotton was suitable for the manufacture of collodion, and that the most easily explosible was the most insoluble in alcoholic ether. Since the strongest nitric acid produced the strongest gun-cotton, it was concluded and shown that a cotton suitable for collodion manufacture was to be obtained by employing a less concentrated acid. It was also obtained by using potassium nitrate and sulphuric acid instead of the two acids, since in the former case the nitric acid was gradually evolved from the nitrate, and the action in the cotton was less energetic.

One of the great objects had in view by the inventors of high explosives has been their adaptation to war purposes and their use as explosives for shell, torpedoes, and other similar projectiles. Most of the high explosives for this purpose are either gun-cotton or picric acid compounds. It has been generally supposed that picric acid and its compounds were so susceptible to concussion that the mere act of striking against a thin armor-plate would be sufficient to cause shells containing them to explode before they could penetrate. But at the present time it is generally conceded that, with some of these substances, means have been found to delay explosion until after a certain degree of penetration. The principal high explosives at present undergoing experiment are ecrasite, emmensite, extralite, lyddite, melinite, bellite, roborite. *Ecrasite* is said to be a composition of blasting gelatine treated with the sulphate or hydrochlorate of ammonia, or both, and is reported to be as well adapted for use in small arm cartridges as for bursting charges for shells. Extensive private trials have been conducted in Austria, and the effects produced have been stated to resemble those ascribed to melinite. It is said to be exceedingly powerful, and in no way sensitive to mechanical and atmospheric influences. In one experiment an armored tower surmounted by a 6-inch thick armored cupola was used as a target. A shell filled with ecrasite penetrated the cupola and burst inside, destroying the inner parts of the tower and shattering its walls. To show its insensibility to mechanical influences a shell charged with this explosive was fired at a target composed of three 4-inch plates of steel placed close together. The shell perforated the first two plates, and buried itself in the third without exploding. It is said to be perfectly safe to handle, and its effects, as compared with those of dynamite, are stated to be as 10 to 7. The strenuous efforts that are made by the Austro-Hungarian government to guard the secret of its manufacture indicate that it is considered a valuable explosive for military purposes. In Jan., 1888, letters patent were granted to Dr. Stephen H. Emmens, of New York, for a new organic acid discovered by him to which the name of Emmens acid has been given, and the compounds formed with this acid bear the general name of *emmensite*. The acid was at first obtained by dissolving at a gentle heat an excess of commercial picric acid in concentrated fuming nitric acid (50° to 52° C.). This operation was effected without danger, as the mixture is refrigerating. The solution on evaporation deposits rhomboidal prisms of a fine yellow color, which are the new acid. In its simplest form emmensite consists of two ingredients, one of them being a new nitro-derivative of certain hydrocarbons of the aromatic series, which can be prepared by the distillation of coal at a low temperature, whilst the other is a mineral salt. For special purposes other chemical ingredients may be added, but the general character of the compound remains the same in all cases. The ingredients are mixed together by a process which forms one of the principal features of the invention, and the resulting product is a true chemical compound which appears in the form of a solid cake or mass, and may be granulated, by which means it is possible to retard or accelerate the explosive action by increasing or diminishing the size of grain. The grade of emmensite experimented with this year by the government officials was composed of one pound each of the following substances, (1) The combustible (nitrate carbolic acid). (2) Nitrate of soda. (3) Nitrate of ammonia. These were incorporated in the following manner: The combustible was placed in an earthen dish and heated over a fire at a temperature of 250° F., until it became semi-liquid; then 2 and 3 were added in small quantities at a time, the mixture being stirred continually until it finally developed into a yellow paste, which, when taken off the fire and cooled, hardened and assumed a yellow color and crystalline appearance. This substance was then placed in a mortar and pulverized with a pestle, the operation being performed apparently with no thought of any danger from explosion. A spoonful of the substance when lighted burned freely and melted into a dark resinous mass. When mixed with charcoal as a reducing agent and fired from a pistol, it gave a sharp snap for a report, and emitted but a slight whiff of very thin smoke. A charge of 60 pounds, placed under a raft composed of forty ordinary railroad ties securely bolted together and exploded by means of an electric fuse; pieces of the raft were blown to a height of over 200 feet, and not a single tie was left intact. Seven-ounce cartridges of emmensite were separately placed against the top, the sides and bottom of five-eighth-inch iron plates and exploded; in each instance the plate was badly broken. Additional experiments are about being carried out for the benefit of the government with this explosive, which thus far has given better promise than any of the others tried in this country.

Extralite is the invention of Rudolph Sjöberg, of Sweden, and its principal ingredients are an ammoniacal salt (either nitrate or oxalate of ammonia), or hydrocarbon and chlorate of potash. The following are examples of proportions of these ingredients, but these proportions may be varied according as the resultant compound is intended to be used either for blasting or military purposes.

| | | | | | | |
|----------|--------------------|---|----|---|----------|--------------------|
| 50 parts | nitrate of ammonia | } | or | { | 50 parts | oxalate of ammonia |
| 5 " | carbonate of " | | | | 10 " | liquid hydrocarbon |
| 10 " | liquid hydrocarbon | | | | 5 " | solid " |
| 5 " | solid " | | | | 35 " | chlorate of potash |
| 30 " | chlorate of potash | | | | | |

This explosive looks like corn-meal. The following characteristics are ascribed to it: that it cannot be exploded except within rigid enclosures, and then only by the use of a percussion cap; that it cannot be exploded by concussion, and that it is perfectly safe to handle. A percussion primer, when attached to a half pound cartridge and fired in the open air, simply ruptured without exploding the cartridge. Its effects for blasting purposes have been shown to be most powerful.

Lyddite now in use by the English military authorities, is supposed to have been the original melinite, and is believed to be a picric acid compound, composed of chloro-pierin, chloride of picryl, naphthaline, iodo, dinitro, and other phenols. The damage done the *Resistance*, an English man-of-war, against which shells charged with lyddite were fired, was terrific—almost incredible in its extent and thoroughness. It is said to be a very safe compound to handle. *Melinite* has been greatly modified since its first introduction, so that it is now considered a safe explosive in manufacture, handling and stowage, and during the past three years that it has been used but one accident has occurred. Picric acid is its chief constituent, either mixed with some oxidizing substance or simply made into a compact mass with collodion. It is quite generally accepted that melinite is not used alone as an explosive in shells, but has joined with it a substance known as cresilite, which is said to add greatly to its stability and to its safety in handling. In the 6.1 inch gun the high explosive shell is to be 5 calibres long, to weigh 121.2 pounds, and to contain a bursting charge of melinite weighing 22.8 pounds. The common shell now in use with this gun is 3 calibres long, weighs 88.2 pounds, and contains a bursting charge of 3.1 pounds. *Bellite* is a Swedish explosive discovered by M. Carl Lamm, and consists of ammonium nitrate and dinitro-benzol, which, when in a melted condition (the melting point is 80° to 90° C.), are mixed with saltpetre, forming a compound of which each molecule explodes. In its granulated state it has a specific gravity of 1.2 to 1.4, and in this state it may be fully exploded by the aid of a small quantity of fulminating mercury, even if the cover be only a thin sheet of tin; but when pressed into the form of hard cakes it requires a stronger impulse and a stronger cover, which must adhere to the cake. Heated in an open vessel, bellite loses its consistency at 90° C., but does not begin to separate before a temperature of 200° is reached; at that point evaporation begins, and increases with a higher temperature, without, however, explosion occurring. If the heating be sudden, it will burn with a sooty flame something like tar; but if the source of heat be removed, it will cease burning and assume a caramel-like consistency, the ingredients being the same as in the original state, with the exception of a somewhat reduced proportion of saltpetre. Experiments have been made in exploding mines with the compound under water, against a dynamometer, and the average of several such explosions, at a distance of 17 feet, was 10.4 per cent. greater in force than that of gun-cotton under exactly similar circumstances, and at a distance of 12.5 feet the percentage of superiority was increased to 15.2. Various other experiments have served to prove that bellite can withstand blows, fire, friction, and vibration without the slightest risk of explosion, and that it can be stored without danger of spontaneous combustion. *Roburite* belongs to what is known as the Sprengel class of explosives—that is, it is an explosive mixture of two substances neither of which by itself possesses explosive properties. In the case of roburite both compounds are solids, and the resulting mixture has a sandy, granular appearance somewhat resembling the commonest yellow sugar. The inventor, Dr. Carl Roth, claims for roburite the following advantages: (1) That the two components are perfectly harmless and inert separately; (2) that the mixture cannot be exploded by friction, percussion, or the application of flame; (3) that when detonated, roburite produces neither spark nor flame; (4) that it produces very little noxious gas; (5) that it is not subject to deterioration through climatic variations of temperature. It should be kept dry, but if it become damp its strength can be safely restored by the application of heat. Experiment has proved roburite to be much stronger than any picric powder, and in some respects more powerful than dynamite, and this fact, together with its perfect safety, eminently fits it for use as the bursting charge for shells. *Carbo-dynamite* has a base of nitro-glycerine, the absorbent being carbon. It possesses two important advantages over ordinary dynamite: a greater explosive force—90 per cent. of the preparation is pure nitro-glycerine, and the absorbent itself it highly combustible—and there is no exudation of nitro-glycerine even when the dynamite is wet. *Graydonite*, named after its inventor, is another high explosive which is at present undergoing extensive experiments in England. Its composition is not generally known, but its effects are said to be more powerful than the majority of high explosives, while at the same time it is safer to handle. The navy departments of most nations have adopted compressed gun-cotton for torpedo charges and submarine ground mines; whereas the military engineers of the land forces lean toward the use of the plastic nitro-gelatine and its derivatives as demolition charges, owing to their enormous shattering power when bridges, stockades, railway embankments, walls, forts and similar obstacles have to be removed. Such explosives as nitro-gelatine, gelatine-dynamite, and forcite being far more powerful and exerting a greater local action than gun-cotton, should be

able to rival the latter in submarine mining ; but, so far as safety is concerned, wet gun-cotton, no doubt, offers an advantage which nitro-glycerine preparations do not possess. As bursting charges for shells and hollow projectiles, it is thought that modern explosives will doubtless be extensively applied in the near future, and in that shape will form a terribly destructive engine of war. Their efficiency for that purpose has been proved by the dynamite gun (q.v.), the great requisite being to discharge the dynamite shell from the gun without shock. Compressed air is eminently adapted to effect this in a perfect manner, as the pressure admitted to the gun can be regulated to any degree. Therefore, when firing the projectile, a gentle pressure is admitted, at first just sufficient to overcome its friction and inertia ; but, once in motion, the pressure can be rapidly increased up to the full limit, without in any way subjecting the projectile to undue shock. Compressed air also permits the use of a detonator to explode the charge. The Germans have tried a pneumatic dynamite gun of their own, and Maxim has invented a gun of similar type in which a mixture of air and some volatile hydrocarbon is substituted for air alone. The former has successfully undergone experiments, and a cruiser is being built to carry guns made after the pattern experimented with ; the Maxim design has not yet been practically carried out. See SMOKELESS POWDERS ; GUNPOWDER ; GUN-COTTON ; and MÉLINITE. (Authorities consulted, *A Handbook on Modern High Explosives*, by M. Eissler ; *Inaugural Address of Sir Frederick A. Abel, C.B., D.C.L.*, etc., before the British Association ; annual publications of U. S. Navy.

EXPONENT AND EXPONENTIAL. When it was wanted to express the multiplication of unity for any number of successive times by the same number or quantity, e.g., $1 \times 5 \times 5$, or $1 \times a \times a \times a$, it was found a convenient abbreviation to write 1×5^3 and $1 \times a^3$, or simply 5^3 and a^3 ; and the numbers, 2 and 3, indicating how often the operation of multiplication is repeated, were called exponents. But the theory of exponents gradually received extensions not originally contemplated, and has now an exten-

sive notation of its own. Thus, $a^0 = 1$, $a^1 = a$, $a^{-2} = \frac{1}{a^2}$, $a^{\frac{1}{2}} = \sqrt{a}$, $a^{\frac{1}{3}} = \sqrt[3]{a}$, $a^{\frac{2}{3}} = \sqrt[3]{a^2}$, or the cube root of the square of a . Also a^x is the x th power of a , x being any number integral or fractional; and, a continuing the same, x may be so chosen that a^x shall be equal to any given number. In this case, x is called the logarithm of the number represented by a^x . Considered by itself, a^x is an exponential. Generally, any quantity representing a power whose exponent is variable, is an exponential, as a^x , x^x , y^x , etc. Exponential equations are those which involve exponentials, such as $a^x = b$, $x^x = c$.

EXPORTS. See IMPORTS AND EXPORTS.

EX POST FACTO, in law, an act that operates retrogressively ; a law passed after the commission of an act by which such an act may be punished. The constitution of the United States prohibits the passage of such laws, either by congress or by any other legislative body. Chief-Justice Marshall defines an *ex post facto* law to be one which rendered an act punishable in a manner in which it was not punishable when it was committed. Various decisions of the courts make this definition more specific, and hold as *ex post facto* any law which makes criminal an act which, done before its passage, was innocent; any law which makes a crime greater than it was at the time of commission; any law which inflicts punishment greater than was affixed to a crime when committed; any law which changes the rules of evidence as to an offense already committed and to the prejudice of a defendant. The constitutional prohibition of *ex post facto* laws applies to criminal and penal statutes only, and not to those which simply affect property.

EXPOSITION. See EXHIBITION.

EXPOSITION OF THE SACRAMENT, in the Roman Catholic service, is the public exhibition of the holy sacrament, instituted with certain ceremonies, for the veneration of the faithful. There is evidence to warrant the belief that as early as the 14th century the sacrament was thus exposed at least on Corpus Christi, but not until the 16th century did it become customary to expose the host at other times, as on occasions of public distress, when it is said to have been introduced by a Capuchin of Milan, Fr. Joseph, who died in 1556. The practice is still in use, of placing the host within the monstrance above the altar and appointing persons to relieve each other night and day in watching and praying for a period of forty hours. On the second day a mass "for peace" is sung, and it is again placed in the tabernacle after a high mass (that of deposition) has been pronounced. The exposition is not allowed without leave from the bishop or without an apostolic indult. No mass is celebrated at the altar during the exposition ; the bells are not rung at masses said at other altars.

EXPOSURE OF INFANTS. See INFANTICIDE.

EXPRESS, a business which has grown within the past quarter of a century to enormous importance. It was in the spring of 1839 that William F. Harnden advertised to take charge of money and small parcels to transmit between Boston and New York, and from his single carpet-bag has risen a system of inter-communication between places and persons that, for numbers of stations and length of route, is surpassed only by the post-office department. The all-embracing express reached across the ocean as early as 1855, and now this peculiar American institution extends literally to the ends of the earth.

The most valuable articles are sooner intrusted to a responsible express than to government mails, for, in addition to ever-increasing care, there is a system of package insurance which secures the owner in almost any case of loss. The express business is too well known to need any particular description. It is estimated that the American express companies alone cover about 75,000 m. of road; make a travel of 400,000 m. per day; employ over 20,000 men, 4,000 horses, and have from 9,000 to 10,000 offices. A large proportion of the business is the collection of small sums for merchants, the C. O. D. packages implying "collect on delivery" the sum marked on the package as due.

EXTENSION, in logic, is a word put into contrast with another term, **COMPREHENSION**, and the two mutually explain each other. A general notion is said to be extensive according to the extent of its application, or the number of objects included under it. Thus, figure is a term of very great extension, because it contains in its compass many varieties, such as round, square, oblong, polygonal, etc. In like manner, European is more extensive than German, man than European, animal than man, organized being than animal. The highest genera are formed by taking in a wider range of objects. Matter and mind are the most extensive classes that we can form. For, although a higher genus is sometimes spoken of, viz., existence; to call this a class is to generalize beyond real knowledge, which does not begin till we have at least two actual things to contrast with each other. What can be contrasted only with non-existence, non-entity, or nothingness, is not genuine knowledge: no property can be affirmed of it apart from the thing itself. Matter, in its contrast to mind, is a real cognition; and *vice versa*, mind in its contrast to matter. These, then, are the most extensive terms that have any real knowledge attached to them. But this property of E. is gained by dropping more and more of the peculiarities of the included individuals; "organized being," in order to include both plants and animals, must drop from its signification what is peculiar to each, and mean only what is common to both. In short, these very extensive notions have a very narrow signification; it is the less extensive that have most meaning. The meaning of "man," or the number of attributes implied in this generic expression, is large. Everything that goes to a human being—the human form and organization, the mental attributes of reason, speech, etc.—is expressed by this term, which is on that account said to be more **COMPREHENSIVE** than animal or organized being. Thus it may be seen that the greater the E., the less is the comprehension; and the greater the comprehension, the less is the extension.

EXTRACTION OF ROOTS. The roots which have in practice to be most frequently extracted are the *square* and *cube* roots. It is proposed to explain the rule for their extraction as it is given in books of arithmetic. And first of the square root. The square of $a+b$ is $a^2+2ab+b^2$, and we may obtain the rule by observing how $a+b$ may be deduced from it. Arranging the expression according to powers of some letter a , we observe that the square root of the first term is a .

$$\begin{array}{r} a^2 + 2ab + b^2(a+b) \\ \underline{a^2} \\ 2a+b \end{array}$$

Subtract its square from the expression, and the remainder is $2ab+b^2$. Divide $2ab$ by $2a$, and the result is b , the other term in the root. Multiply $2a+b$ by b , and subtract the product from the remainder. If the operation does not terminate, it shows that there is another term in the root. In this case, we may consider the two terms $a+b$ already found as one, and as corresponding to the term a in the preceding operation; and the square of this quantity having been by the preceding process subtracted from the given expression, we may divide the remainder by $2(a+b)$ for the next term in the root, and for a new subtrahend multiply $2(a+b)+$ the new term, by the new term; and the process may be repeated till there is no remainder. The rule for extracting the square root of a number is an adaptation of this algebraical rule. In fact, if the number be expressed in terms of the radix of its scale, it is seen to be a concealed algebraical expression of the order we have been considering. Thus, $N = ar^n + br^{n-1} + \dots + q$. The number 576 in the denary scale may be written $5 \times 10^2 + 7 \times 10 + 6$; and treating it as an algebraical expression, we should find its root to be $2 \times 10 + 4$, or 24. The only part of the arithmetical rule now requiring explanation is the rule of pointing. As every number of one figure is less than 10^1 , its square must be less than 10^2 ; generally, every number of n figures is less than 10^n (which is 1 followed by n ciphers); but also every number of n figures is not less than 10^{n-1} , and therefore its square is not less than 10^{2n-2} —which is the smallest number of $2n-1$ figures. Also, 10^{2n} is the smallest number of $2n+1$ figures. It follows that the square of a number of n figures has either $2n$ or $2n+1$ figures. If, then, we put a point over the units place of a number of which the root is to be extracted, and point every second figure from right to left, the number of points will always equal that of the figures in the root. If the number of figures be even, the number will be divided into groups of two each; if odd, the last group will contain only a single figure.

The rule for the extraction of the cube root of a number is deduced from that for

the extraction of the cube root of an algebraical expression in the same way as in the case of the square root. The cube of $(a + b)$ is

$$\begin{array}{r} a^3 + 3a^2b + 3ab^2 + b^3(a + b) \\ \hline 3a^2) \quad \begin{array}{r} 3a^2b + 3ab^2 + b^3 \\ 3a^2b + 3ab^2 + b^3 \end{array} \end{array}$$

Hence the rule in algebra. Arrange the expression according to descending powers of a , the cube root of the first term a^3 is a , the first term of the root. Subtract its cube from the expression, and bring down the remainder. Divide the first term by $3a^2$, and the quotient is b , the second term of the root. Subtract the quantity $3a^2b + 3ab^2 + b^3$. If there is no remainder, the root is extracted. If there is, proceed as before, regarding $a + b$ as one term, corresponding to a in the first operation. Let, for example, $a + b = a^1$, then $3a^1$ is the new trial divisor. If c be the new term or third figure of the root, then the quantity to be subtracted to get the next remainder is $3a^1c + 3ac^2 + c^3$, and so on till there is no remainder. The rule of pointing in the extraction of the cube root may be proved, as in the case of the square root, by showing that the cube of a number of n figures contains $3n$, $3n - 1$, or $3n - 2$ figures; and, therefore, if we put a point over the units place, and on each third figure, we shall have as many periods as there are figures in the root.

It may be observed that a rule for the extraction of any root of a number may be got from considering how, from the expansion of $a + b$ to the n th power, or $a^n + na^{n-1}b +$, etc., the root $a + b$ is to be obtained. See EVOLUTION AND INVOLUTION.

EXTRACTIVE MATTER is the term applied to certain organic matters resembling humine, found in soils during the decay of vegetable matter, and which are precipitated during the concentration of water solutions.

EXTRACT OF MEAT is obtained by acting upon chopped meat by cold water, and gradually heating, when about one-eighth of the weight of the meat dissolves out, leaving an almost tasteless insoluble fibrine. The extract of meat contains the savory constituents of the meat, and is a light nutritious article of food. See BEEF-TEA and BROTH. It may be concentrated into small bulk, and when desired, may be afterwards treated with water, and being heated, forms an agreeable, light, and nutritive soup. See PRESERVES.

EXTRACTS, in a technical sense, are medicinal preparations of vegetable principles, got either by putting the plants in a solvent or menstruum, and then evaporating the liquid down to about the consistency of honey, or by expressing the juice of the plants and evaporating; this last is properly *inspissated juice*. E., therefore, contain only those vegetable principles that are either held in solution in the juices of the plants themselves, or are soluble in the liquid employed in extracting them, and at the same time are not so volatile as to be lost during evaporation. Now, as many extractive matters are more or less volatile, it makes a great difference whether the operation is conducted at a low or at a high temperature. E. are called *watery* or *alcoholic* according as the menstruum employed is water or spirits. Ether is also used in extracting. Different plants of course afford different E., some being of the nature of bitters, others being used as pigments, tannin, etc. E. are liable to great uncertainty in point of strength and composition, and require to be prepared with great care. Evaporation in vacuo is found to be a great improvement.

EXTRADITION, the delivery up by one state or nation to another of a fugitive from justice. Strictly speaking, extradition is a modern practice, although Hannibal's delivery was stipulated for in a Roman treaty, and more than once Roman citizens were surrendered to a foreign power. These acts, like many others in ancient, mediæval, and early modern times, were confined to those who were considered enemies of the state, or more especially, its head. The national teachings of former centuries made each state feel that it was its duty to injure its neighbor as much as possible. The right to deny the privilege of asylum was a prerogative of the sovereign, and sovereigns frequently used it so as best to secure their mutual personal safety. Thus extradition, or whatever name we give it, was confined to what we should now call political offenses.

It is mainly within the last hundred years that a more Christian international comity has developed. Increased intercourse and the modern means of transportation have greatly facilitated flights from justice, while a sense of common interest has almost destroyed international hatreds. Each decade it has become more evident that the failure of civil justice in one country is likely to result unfavorably to its neighbor. No country has ever willingly received the convicts of another, and it was impossible that nations with liberal ideas should long fail to perceive that there was no great difference between encouraging crime and furnishing an asylum for fugitives from justice. If, then, there was a common national interest in the punishment of criminals, and if offenders against foreign laws were undesirable immigrants, extradition was both an advantage and a duty.

The great writers on international law have not been in harmony in regard to the question as to whether extradition is a matter of perfect obligation. Some of the ablest

have argued in the affirmative, and many more, especially among modern writers, insist that it is a strong moral obligation. As none have denied the importance of extradition, the discussion is really not a practical one. All have admitted that, owing to the great difference between the ideas and penal codes of different nations, it was better for them to give their mutual obligations in this respect definite expression in treaties. Clarke, the leading English writer on extradition, states that its history in England begins with the Ashburton treaty of 1842 with the United States. Excepting the Jay treaty of 1794, which contained an article on extradition limited to twelve years, all the other treaties covering this subject made by the United States are of a subsequent date. The two conventions between the United States and Great Britain, in 1842 and 1890, show what crimes two leading nations of to-day consider extraditable. The former mentioned murder, assault with intent to commit murder, piracy, arson, robbery, forgery, and the utterance of forged papers; the latter added voluntary manslaughter, counterfeiting or altering money, etc., embezzlement, larceny, etc., fraud by a bailee, banker, etc., perjury or subornation of perjury, rape, abduction, childstealing, kidnapping, burglary, etc., piracy by the law of nations, revolt or conspiracy to revolt by two or more persons on board a ship on the high seas, etc., crimes and offenses against the laws of both countries for the suppression of slavery and slave-trading.

The tendency is to enlarge the list of extraditable crimes, but there are many which will not soon, if ever, be included. Such are political crimes; for what one nation considers treason may seem to another to be the height of philanthropy. Offenses against religion and marriage laws are generally regarded as not proper matters for extradition, owing to the fact that hardly any two nations have similar ideas in regard to them. As the custom laws of each nation are considered to be levied against the interests of all others, it would be absurd to expect to add offenses against them to the number of extraditable crimes. The general rule is that an extraditable crime must be one commonly recognized by civilized nations as a *malum in se*, and not a *malum prohibitum*.

The method and prerequisites of extradition may perhaps best be shown by a quotation from the Ashburton treaty. It provides that the two powers shall upon mutual requisitions deliver up to justice all persons charged with the commission of certain crimes "provided that this shall only be done upon such evidence of criminality as, according to the laws of the place where the fugitive or person so charged shall be found, would justify his apprehension and commitment for trial if the crime or offense had there been committed; and the respective judges and other magistrates of the two governments shall have power, jurisdiction, and authority, upon complaint made under oath, to issue a warrant for the apprehension of the fugitive or person so charged, that he may be brought before such judges or other magistrates respectively, to the end that the evidence of such criminality shall be heard and considered; and if, on such hearing, the evidence be deemed sufficient to sustain the charge, it shall be the duty of the examining judge or magistrate to certify the same to the proper executive authority, that a warrant may issue for the surrender of such fugitive." The complaint under oath is commonly made by a consular officer of the state asking for extradition. If all the proceedings are satisfactory, the president of the United States (in our practice) causes the surrender to be made to the agent of the demanding power. The expenses are borne by the party making the requisition.

There are two limitations to the foregoing which are worthy of brief notice. 1. It is an almost universal rule that citizens are not surrendered to foreign powers on extradition requisitions. This is mainly due to two facts. Along certain lines every nation still retains a lingering prejudice that every other nation is an unjust enemy and is incompetent to judge the acts of foreign subjects. Where this prejudice has greatly waned, most nations have passed laws for the punishment of citizens for crimes committed abroad. According to the logic of extradition there seems to be no valid reason for this exception. 2. The question as to whether a person extradited for one offense may be tried for another has frequently arisen. The authorities give many instances of prosecutions for other offenses than those named in the requisitions. In 1870 the British parliament passed a law forbidding the surrender of any fugitive without a positive pledge from the receiving state that he should not be tried for any other offense than that specified in the requisition for extradition, until after he had had an opportunity of returning to her majesty's dominions. Although the United States, during the secretaryship of Hamilton Fish, took serious exception to the application of this law to the famous Winslow case, the principle now receives very general recognition.

From the fact that difficulties in regard to extradition are most satisfactorily anticipated by treaties, it should not be inferred that extradition has not taken place without them. Spain and other countries having no treaty of extradition with Great Britain have surrendered criminals upon her requisition. The rule in the United States is neither to ask nor to grant extradition in the absence of a treaty. The great exception is the Arguelles case, which would probably not have been granted but for the nefarious character of Arguelles' crime, and the peculiar susceptibility at this time of the minds of Lincoln and Seward on the question of slavery. Except as a means of inducing all nations to enter into definite agreements in regard to extradition, there would seem to be no good reason why a fleeing murderer or forger should go unpunished in the absence of a treaty on extradition.

The law of extradition between the different states of the United States is laid down in art. IV. 2 of the constitution, and in a law of congress of Feb. 12, 1793. The former reads, "A person charged in any state with treason, felony, or other crime, who shall flee from justice and be found in another state, shall, on demand of the executive authority of the state from which he fled, be delivered up, to be removed to the state having jurisdiction of the crime." The latter provides for the form in which the demand shall be made, whereupon it shall be the duty of the governor to whom it is addressed to cause the fugitive to be arrested and delivered over to the agent of the other state. The prerequisites of a valid demand are a formal charge that a crime has been committed against the laws of the demanding state, and that the person charged has fled to the state on whose executive the demand is made. Although there have been some striking exceptions, the better opinion is that the governor on whom the demand is made has no option in the matter, although the alleged offense may not be a crime in the state where the fugitive has sought an asylum.

The United States has made treaties with the following named countries :

| COUNTRIES. | When concluded. | COUNTRIES. | When concluded. |
|---------------------------|-----------------|--|-----------------|
| Austria..... | July 3, 1856 | Mecklenburg-Strelitz..... | Dec. 2, 1853 |
| Baden | Jan. 30, 1857 | Mexico..... | Dec. 11, 1861 |
| Bavaria | Sept. 12, 1853 | Netherlands] | May 22, 1890 |
| Belgium *..... | Mar. 19, 1874 | | June 2, 1887 |
| Bremen..... | June 13, 1882 | Nicaragua..... | June 25, 1870 |
| Dominican Republic..... | Sept. 6, 1853 | North German Union..... | Feb. 22, 1868 |
| Ecuador..... | Feb. 8, 1867 | Oldenburg | Dec. 30, 1853 |
| France..... | June 28, 1872 | Orange Free State..... | Dec. 22, 1871 |
| | Nov. 9, 1843 | Ottoman Empire..... | Aug. 11, 1874 |
| | Feb. 24, 1845 | Peru †..... | Sept. 12, 1870 |
| Great Britain †..... | Feb. 10, 1858 | Prussia and other states of the Germanic Confederation..... | June 16, 1852 |
| | Nov. 19, 1794 | San Salvador..... | May 23, 1870 |
| | Aug. 9, 1842 | Schaumburg-Lippe..... | June 7, 1854 |
| Hanover ‡..... | July 12, 1889 | Spain **..... | Jan. 5, 1877 |
| Hawaiian Islands..... | Jan. 18, 1855 | | Aug. 7, 1882 |
| Hayti..... | Dec. 20, 1849 | Sweden and Norway..... | Mar. 21, 1860 |
| Italy §..... | Nov. 3, 1864 | Swiss Confederation..... | Nov. 25, 1850 |
| | Mar. 23, 1868 | Two Sicilies ††..... | Oct. 1, 1855 |
| Japan..... | Jan. 21, 1869 | Venezuela ‡‡..... | Aug. 27, 1860 |
| Luxemburg..... | June 11, 1884 | Württemberg..... | Oct. 13, 1853 |
| Mecklenburg-Schwerin..... | Apr. 29, 1886 | | July 27, 1868 |
| | Oct. 29, 1883 | | |
| | Nov. 26, 1853 | | |

EXTRALITE. See **EXPLOSIVES OF HIGH POWER.**

EXTRAVAGANTES CONSTITUTIONES, papal constitutions of John XXII. and some of his successors, supplemental to the "Corpus Juris Canonica." They got their name from the fact that they were not arranged in order with the other constitutions, but were "outside wanderers" from the general code.

EXTRAVAGANZA, a musical or dramatic piece of great wildness or absurdity, or characterized by extravagant and fantastic qualities, such as *Hudibras* or *Bombastes Furioso*.

EXTRAVASATION is the escape of any of the fluids of the living body from their proper vessels (*vas*) through a rupture or injury in their walls. Excrementitious matter thus sometimes escapes into the abdomen through a wound or ulceration of the bowels. But the term is oftenest used in speaking of the escape of blood from injured blood-vessels. E. is distinguished from exudation by this, that in the last the vessels remain entire, and the effusion takes place by filtration through their walls; nor does more than a part of the blood so escape, the blood globules being retained, while in E. perfect blood is effused. Many kinds of E. are immediately fatal, such as that of urine or of gall into the abdomen, or of blood from the vessels of the brain in many cases of apoplexy. The dark color resulting from a bruise is owing to extravasated blood.

EXTREME UNCTION, a sacrament of the Roman Catholic church, which, as the other sacraments supply spiritual aid in the various circumstances of life, is believed to impart to the Christian in death grace and strength to encounter the struggle, as well spiritual as bodily, of the dying hour. The right of unction in different forms is common to several of the sacraments; the name "extreme" is given to that of the present sacrament, because it is reserved for the last act of the Christian career. The council of Trent declares this sacrament, although "promulgated" in the well-known passage of St. James v. 14, 15 (which Protestants regard as having more to do with the general belief in the sanative properties of oil), to have been "instituted" by Christ. The fathers

* Replaced by treaty of 1882.

† Expired October 28, 1807.

‡ Terminated by absorption of Hanover by Prussia.

§ Amended by treaties of 1869 and 1884.

|| Replaced by treaty of 1887.

¶ Terminated March 31, 1886.

** Amended by treaty of 1882.

†† Replaced by treaty of 1868 with Italy and its

amendments.

‡‡ Terminated October 22, 1870.

frequently allude to the right of unction, and although many of these allusions certainly refer to the unctions of baptism and confirmation, yet Catholics rely on several passages of Origen, Chrysostom, Cæsarius of Arles, and pope Innocent I., as decisive regarding the unction of the dying, as also upon the fact that in the various separated churches of oriental Christians—Greek, Coptic, Armenian, and Nestorian—the rite is found, although with many ceremonial variations. In the Roman Catholic church, the sacrament is administered by the priest, who, “dipping his thumb in the holy oil, anoints the sick person, in the form of the cross, upon the eyes, ears, nose, mouth, hands, and feet; at each anointing making use of this form of prayer: ‘Through this holy unction, and his most tender mercy, may the Lord pardon thee whatever sins thou hast committed by thy sight. Amen.’ And so of the hearing and the rest, adapting the form to the several senses.”—Challoner's *Catholic Christian Instructed*. E. U. is reputed by Catholics one of the sacraments “of the living;” that is, it ordinarily requires that the recipient should have previously obtained remission of his sins by absolution or by perfect contrition; but it is held to remit, *indirectly*, actual sins not previously remitted, and also (although not infallibly, but according to the merciful designs of Providence) to alleviate, and even to dispel, the pains of bodily disease. The holy oil which forms the “matter” of this sacrament must be blessed by the bishop—a ceremony which is performed with great solemnity once each year by the bishop, attended by a number of priests, on Maundy-Thursday. The oil so blessed is reserved for use during the year. In the Greek church, the sacrament is administered by several priests conjointly. In its most solemn form, seven priests unite in its administration; in ordinary circumstances, it is conferred by two. The Greek form of words also differs, although not substantially, from that of the Latin church. The Greeks call this sacrament “the holy oil,” and sometimes “the oil of prayer.”

EXTREMITY. See SKELETON.

EXUMAS, comprising Great Exuma, Little Exuma, and the Exuma Keys, form part of the group of the Bahama islands. Their inhabitants are employed partly in agriculture, including at one time the growing of cotton, but chiefly in salt-making. Great Exuma is 30 miles long and 3 miles wide, and has one of the best harbors in the Bahamas. It is crossed by the Tropic of Cancer. The population of the group is estimated at 2300.

EXUVIÆ, a term applied to organic remains, now seldom employed, but frequently used by the older geologists.

EYALET, or VILAYET, is the largest and most important of the administrative divisions of the Turkish empire, formerly known as pashalics. These are again divided into *livas* or *sanjaks*, the *livas* into *cazas* or districts, and the *cazas* into *nahiës* or communes, containing villages or hamlets. Each E. or general government, as it may be called, is administered by a pasha, who is governor, and the general name for whom is *call* or viceroy. The governors of the eyalets belong to the dignities of the sword, and are pashas of two tails; and when they are raised to the rank of vizier, as is frequently the case, they become pashas of three tails.

EYAM (pronounced Ee-am) is a small village in a secluded valley of Derbyshire. In the autumn of 1665, the plague was brought here from London in a box of clothing. The rector of the parish, William Mompesson, displayed great courage and devotion in his care for the sick and dying. The plague lingered for over a year, in which time more than 250 out of 350 people died. Another rector of the town survives in history for living in his vestry for years to avoid a breach of promise suit. He lived so until his death, which occurred in 1705. Eyam is noted for barytes mining.

EYAS (formerly *nyas*, *nias*; French, *niais*, stupid; Lat. *nidacem*, fresh from the nest) is a young hawk just taken from the nest to be trained for the chase. See FALCONRY. Eyases were not much thought of by the falconers of the Middle Ages, but are preferred in modern times for the following reasons:—they are easier to obtain, to train, and to keep; they moult better and quicker than passage or wild-caught hawks, and if lost in the field, will frequently find their way home, or will linger near the place where they were liberated. Hawks that have been carefully taught and discreetly work, become exceedingly clever, and very soon learn to regulate their flight by the movements of their master.

EYB, ALBRECHT VON, 1420–1478, was an eminent German ecclesiastic, who became chamberlain to Pope Pius II. In 1472 he published a book of selections from ancient authors, entitled *Margarita Poetica*, which has been frequently reprinted.

EYBAR is a town in the province in Guipuzcoa, Spain, twenty-three miles southwest of St. Sebastian. It is in the midst of picturesque and romantic scenery, and is noted principally for the manufacture of arms. Population, 2396.

EYCK, HUBERT and JAN VAN, two illustrious painters of the old Flemish school. Much discussion has arisen as to the time of the birth of these brothers, and the various dates assigned range from 1350 to 1400. Some maintain that Hubert was born in 1366, and Jan in 1370; while Kugler—in general a good authority on ancient art—states the dates to be 1366 and 1400, making Hubert 34 years older than Jan. Their birthplace

was Maas-Eyck, and they chiefly resided at Bruges and Ghent, and became the founders of the Flemish school of painting. The honor of being the inventors of oil-painting is claimed for them, though sufficient evidence has been adduced to show that it was practiced previously. Before their time, the custom, however, particularly in Italy, was to paint with gums or other substances of an adhesive nature dissolved in water; and if not the inventors, they were at least the first who brought into notice and perfected the mode of mixing colors with oil or some medium of which oil was the chief ingredient; while, for transparent and brilliant coloring and minute finish, their works have never been surpassed. Till the death of Hubert, the brothers generally painted in conjunction; one of their most important works was an altar-piece with folding-doors, representing the Elders adoring the Lamb—a subject taken from the Apocalypse—painted for *Jodocus Vyts*, who presented it to the cathedral of St. Bavon, in Ghent. The two central divisions of this picture are all that now remain in the church at Ghent. Some of the wings are in the gallery at Berlin. The masterpieces of the brothers are for the most part in the cities of Ghent, Bruges, Antwerp, Berlin, Munich, and Paris. In the national gallery, London, there are three pictures of Jan van E., which, though small, well exemplify the high qualities of his works. These are portraits of a Flemish merchant and his wife, standing in the middle of an apartment, with their hands joined—signed and dated 1434: of the portrait of a man in a cloak and fur collar, with a red handkerchief twisted round the head as a turban—painted, according to an inscription on the lower part of the frame, Oct. 21, 1433: and portrait of a man with a dark-red dress, with a green head-covering—signed and dated 10th Oct., 1432. Hubert died in 1436, and Jan in 1440. Compare Waagen, *Ueber Hub. und Jan van Eyck* (Breslau, 1822).

EYCK, KASPAR VAN, a Flemish painter who is known now by his excellent marine views, was born in Antwerp, Belgium, about the middle of the seventeenth century. He died in 1673.

EYCK, MARGARET VAN, a sister of Hubert and Jan (q.v.), is said never to have married because of her devotion to painting. A "Madonna and Child," in the National Gallery in London, has always been considered her work, until recently. The catalogue of 1889 attributes it to an unknown artist of the Early Flemish school. A miniature in the missal of the Duke of Bedford is also attributed to her. She died about 1430.

EYCKENS, PIETER, called the ELDER, painter, was born in Antwerp, Belgium, about 1600. He spent most of his life in his native city painting historical scenes, many of which are in the churches of Antwerp. Among these may be particularly noticed "Elijah Ascending in the Chariot of Fire," and "Saint Catharine Disputing." His paintings are remarkable for their coloring and expression. The date of his death is uncertain. His son, JAN, was an expert painter of fruits and flowers.

EYE, a parliamentary and municipal borough in Suffolk, 20 m. n. of Ipswich. Its streets are rather narrow and irregular. Pop. (1881) of municipal borough, 2,296; of parliamentary borough, 6,293. It sends 1 member to parliament, the parliamentary borough including 11 parishes. Eye, in Anglo-Saxon, means island; the river surrounding the town. Breweries, an iron-foundry, and a large flax manufactory furnish employment.

EYE, JOHANN LUDOLF AUGUST VON, art-historian, was born at Fürstenau, Hanover, May 24, 1825. He was educated at Göttingen. He has written numerous valuable works on both ancient and modern art, and several on philosophical subjects. Among his many works may be noticed particularly *Leben und Wirken Albrecht Dürer's* (1860); *Kunst und Leben der Vorzeit* (1868); *Wesen und Werth des Daseins* (1870); and *Das Reich des Schönen* (1878).

EYE, ANATOMY AND PHYSIOLOGY OF THE. In this article we shall consider: 1. The structure of the human eyeball, and of certain accessory parts or appendages which serve to protect that organ, and are essential to the due performance of its functions. 2. The most striking modifications which this organ presents in some of the lower animals. 3. The special uses of the various parts of the eye considered as an optical instrument; and 4. The action of the retina.

1. The *globe of the eye* is placed in the anterior part of the cavity of the orbit (q. v.) in which it is held in position by its connection with the optic nerve posteriorly, and with the muscles which surround it, and by the eyelids in front. It is further supported behind and on the sides by a quantity of loose fat, which fills up all the interstices of the orbit, and facilitates the various movements of which the eye is capable.

The form of the eyeball is nearly spherical; but on viewing the organ in profile, we see that it is composed of segments of two spheres of different diameters. Of these, the anterior, formed by the transparent cornea, has the smaller diameter, and is therefore the most prominent; and hence the antero-posterior slightly exceeds (by about a line) the transverse diameter. The radius of the posterior or sclerotic segment is about $\frac{1}{8}$ ths, and that of the anterior segment about $\frac{1}{10}$ ths of an inch.

When the eyes are in a state of repose, their antero-posterior axes are parallel; the optic nerves, on the other hand, diverge considerably from their commissure within the cavity of the skull to the point where they enter the globe; consequently, their direction

does not coincide with that of the eye. Each nerve enters the back of the globe at a distance of about $\frac{1}{4}$ th of an in. on the inner side of the antero-posterior axis of the eye.

The eyeball is composed of several investing membranes, and of certain transparent structures, which are inclosed within them, and which, together with the cornea (one of the membranes), act as refractive media of various densities upon the rays of light which enter the eye.

The outermost coat of the eye is the *sclerotic* (from *skleros*, hard). It is a strong, dense, white, fibrous structure, covering about four fifths of the eyeball, and leaving a circular deficiency anteriorly, which is occupied by the cornea. Posteriorly, it is perforated by the optic nerve, and it is there continuous with the sheath which that nerve derives from the dura mater, the fibrous investment of the brain and spinal cord. Near the entrance of the nerve, its thickness is about $\frac{1}{10}$ th of an in.; from this it diminishes to about $\frac{1}{40}$ th; but in front it again becomes thicker, from the tendinous insertions of the straight muscles which blend with it. This coat, by its great strength and comparatively unyielding structure, maintains the inclosed parts in their proper form, and serves to protect them from external injuries.

The *cornea* (so called from its horny appearance) is a transparent structure, filling up the aperture left in the anterior part of the sclerotic. Its circumference is overlaid by the free edge of the sclerotic, which in some parts presents a groove, so as to retain it more firmly; and the connection by continuity of texture between the two structures is so close, that they cannot be separated in the dead body without considerable maceration.

The cornea, in consequence of its greater convexity, projects beyond the line of the sclerotic; the degree of convexity, however, varies in different persons, and at different periods of life. It is thicker than any part of the sclerotic, and so strong as to be able to resist a force capable of rupturing that tunic.

Although beautifully transparent, and appearing to be homogeneous, it is in reality composed of five layers, clearly distinguishable from one another—viz. (proceeding from the front backwards) 1. The conjunctival layer of epithelium. It is in this epithelium that particles of iron, stone, etc., forcibly driven against the eye, usually lodge, and it is a highly sensitive membrane. 2. The anterior elastic lamina forming the anterior boundary of the cornea proper; it is not more than $\frac{1}{3000}$ th of an inch in thickness; and its function seems to be that of maintaining the exact curvature of the front of the cornea. 3. The cornea proper, on which the thickness and strength of the cornea mainly depend. 4. The posterior elastic lamina, which is an extremely thin membrane, in which no structure can be detected. It probably contributes, like the anterior lamina, to the exact maintenance of the curvature of the cornea, so necessary for correct vision. 5. The posterior epithelium of the aqueous humor, which is probably concerned in the secretion of that fluid.

For further details regarding these different layers, we must refer to Todd and Bowman's *Physiological Anatomy*, vol. ii. pp. 17-21.

The *choroid coat* is a dark-colored vascular membrane, which is brought into view on the removal of the sclerotic. Its outer surface, which is nearly black, is loosely connected with the sclerotic by connective tissue, in which are contained certain nerves and vessels—termed the ciliary nerves and vessels—which go to the iris. Its inner surface is soft, villous, and dark-colored. In front, it is attached to the membrane of the vitreous humor by means of the ciliary processes, which consist of about sixty or seventy radiating folds. These are alternately long and short, and each of them is terminated by a small free interior extremity; and they are lodged in corresponding folds in the membrane of the vitreous humor. In other parts, it is loosely connected with the retina. The choroid is composed of minute ramifications of vessels—especially of veins, which, from their whirl-like arrangement, are termed *vasa vorticoso*—of connective tissue, and of pigment cells, which usually approximate to the hexagonal form, and are about $\frac{1}{1000}$ th of an inch in diameter. In albinos, this pigment is absent, and hence their eyes have a pink appearance, which is due to the unconcealed blood in the capillaries of the choroid and iris.

The *iris* may be regarded as a process of the choroid, with which it is continuous, although there are differences of structure in the two membranes. It is a thin flat membranous curtain, hanging vertically in the aqueous humor in front of the lens, and perforated by the pupil for the transmission of light. It divides the space between the cornea and the lens into an anterior (the larger) and a posterior (the smaller) chamber, these two chambers freely communicating through the pupil. The outer and larger border is attached all round to the line of junction of the sclerotic and cornea, while the inner edge forms the boundary of the pupil, which is nearly circular, lies a little to the inner side of the center of the iris, and varies in size according to the action of the muscular fibers of the iris, so as to admit more or less light into the interior of the eyeball; its diameter varying, under these circumstances, from about $\frac{1}{4}$ d to $\frac{1}{8}$ th of an inch. It is muscular in its structure, one set of fibers being arranged circularly round the pupil, and, when necessary, effecting its contraction, while another set lie in a radiating direction from within outwards, and by their action dilate the pupil. These fibers are of the unstriped or involuntary variety. The nerves which are concerned in these movements will be presently noticed.

The varieties of color in the eyes of different individuals, and of different kinds of animals, mainly depend upon the color of the pigment which is deposited in cells in the substance of the iris.

Within the choroid is the *retina*, which, although continuous with the optic nerve—of which it is usually regarded as a cuplike expansion—differs very materially from it in structure. Before noticing the elaborate composition of this part of the eye, which has only been revealed by recent microscopical investigation, we shall briefly mention those points regarding it which can be established by ordinary examination. It is a delicate semi-transparent sheet of nervous matter, lying immediately behind the vitreous humor, and extending from the optic nerve nearly as far as the lens. On examining the concave inner surface of the retina at the back of the eye, we observe, directly in a line with the axis of the globe, a circular yellow spot (*limbus luteus*), of about $\frac{1}{80}$ th of an inch in diameter, called, after its discoverer, the *yellow spot of Sömmerring*. As there has been much discussion regarding the structure and function of this spot, we may observe that Dr. Todd and Mr. Bowman, two of our most eminent English microscopists, after several examinations, regard it as a small mound or projection of the retina towards the vitreous humor, with a minute aperture in the summit. The only mammals in which it exists are man and the monkey. Its use is unknown, but vision is remarkably perfect at this spot—a circumstance which, however, may possibly be accounted for by the fact, that it is singularly free from blood-vessels, which curve round it, and apparently avoid it.

The structure of the retina, as revealed by the microscope, is in the highest degree remarkable. Although its greatest thickness (at the entrance of the optic nerve) is only about $\frac{1}{160}$ th of an inch, and as it extends anteriorly, it soon diminishes to $\frac{1}{320}$ th of an inch, the following layers from without inwards may be distinguished in all parts of it: 1. The layer of rods and cones, frequently termed, from its discoverer, the *membrane of Jacob*; 2. The granular layer; 3. The layer of gray nerve substance; 4. The expansion of the optic nerve; and, 5. The limiting membrane. Details regarding the nature of these various layers are given in Kölliker's *Manual of Human Histology*, and in Todd and Bowman, *op. cit.*

It now remains for us to describe the *transparent media* which occupy the interior of the globe, and through which the rays of light must pass before they can reach the retina, and form on it the images of external objects. We shall consider them in the order in which the rays of light strike them.

Immediately behind the transparent cornea is the *aqueous humor* which fills up the anterior and posterior chambers which lie between the cornea and the lens. As its name implies, it is very nearly pure water, with a mere trace of albumen and chloride of sodium. As no epithelium exists in front of the iris, or on the anterior surface of the lens, it is most probably secreted by the cells on the posterior surface of the cornea.

The *crystalline lens* lies opposite to and behind the pupil, almost close to the iris, and its posterior surface is received into a corresponding depression on the forepart of the vitreous humor. In form, it is a double-convex lens, with surfaces of unequal curvature, the posterior being the most convex. It is inclosed in a transparent capsule, of which the part covering the anterior surface is nearly four times thicker than that at the posterior aspect, in consequence, doubtless, of greater strength being required in front, where there is no support, than behind, where the lens is adherent to the vitreous membrane. The microscopic examination of the substance or body of the lens reveals a structure of wonderful beauty. Its whole mass is composed of extremely minute elongated ribbon-like structures, commonly called the *fibers of the lens*, which are regarded by Kölliker as *thin-walled tubes*, with clear, albuminous contents. These fibers are arranged side by side in lamellæ, of which many hundred exist in every lens, and which are so placed as to give to the anterior and posterior surfaces the appearance of a central star, with meridian lines.

The lens gradually increases in density, and, at the same time, in refracting power, towards the center; by this means the convergence of the central rays is increased, and they are brought to the same focus as the rays passing through the more circumferential portions of the lens. (According to Brewster, the refracting power at the surface is 1.3767, and at the center 1.3990.)

According to Berzelius, the lens contains 58 per cent of water, 36 of albumen, with minute quantities of salts, membrane, etc. In consequence of the albumen, it becomes hard and opaque on boiling, as we familiarly see in the case of the eyes of boiled fish. In the adult, its long diameter ranges from $\frac{1}{8}$ d to $\frac{3}{8}$ ths, and its antero-posterior diameter from $\frac{1}{16}$ th to $\frac{1}{8}$ th of an inch; and it weighs 3 or 4 grains.

The *vitreous humor* lies in the concavity of the retina, and occupies about four fifths of the eye posteriorly. It is inclosed in the hyaloid membrane, which sends numerous processes inwards, so as to divide the cavity into a series of compartments, and thus to equalize the pressure exerted by the inclosed soft gelatinous mass. Between the anterior border of the retina and the border of the lens, we have a series of radiating folds or platings termed the *ciliary processes of the vitreous body*, into which the *ciliary processes of the choroid* dovetail. The vitreous humor contains, according to Berzelius, 98.4 per cent of water, with a trace of albumen and salts, and hence, as might be expected, its refractive index is almost identical with that of water.

The appendages of the eye now claim our notice. The most important of these appendages are the *muscles within the orbit*, the *eyelids*, the *lacrimal apparatus*, and the *conjunctiva*, to which (although less important) we may add the *eyebrows*.

The *muscles* by which the eye is moved are four straight (or *recti*) muscles, and two oblique (the superior and inferior). The former arise from the margin of the optic foramen at the apex of the orbit, and are inserted into the sclerotic near the cornea, above, below, and on either side. The superior oblique arises with the straight muscles; but, after running to the upper edge of the orbit, has its direction changed by a pulley, and proceeds backwards, outwards, and downwards. The inferior oblique arises from the lower part of the orbit, and passes backwards, outwards, and upwards. The action of the straight muscles is sufficiently obvious from their direction: when acting collectively, they fix and retract the eye; and when acting singly, they turn it towards their respective sides. The oblique muscles antagonize the recti, and draw the eye forwards; the superior, acting above, directs the front of the eye downwards and outwards, and the inferior upwards and inwards. By the duly associated action of these muscles, the eye is enabled to move (within definite limits) in every direction.

The *eyelids* are two thin movable folds placed in front of the eye, to shield it from too strong light, and to protect its anterior surface. They are composed of (1) skin; (2) of a thin plate of fibro-cartilage, termed the tarsal cartilage, the inner surface of which is grooved by thirty or forty parallel vertical lines, in which the Meibomian glands are imbedded; and (3) of a layer of mucous membrane, continuous, as we shall presently see, with that which lines the nostrils, and which joins the skin at the margin of the lids, in which the eyelashes (*cilia*) are arranged in two or more rows. The upper lid is much the larger; and to the posterior border of its cartilage a special muscle is attached, termed the *levator palpebræ superioris*, whose object is to elevate the lid, and thus open the eye; while there is another muscle, the *orbicularis palpebrarum*, which surrounds the orbit and eyelids, and by its contraction closes the eye. The Meibomian glands secrete a sebaceous matter, which facilitates the free motion of the lids, and prevents their adhesion. The eyelashes intercept the entrance of foreign particles directed against the eye, and assist in shading that organ from an excess of light.

The *lacrimal apparatus* consists of the lacrimal gland, by which the tears are secreted; two canals, into which the tears are received near the inner angle of the eye; the sac, into which these canals open; and the duct, through which the tears pass from the sac into the nose. The gland is an oblong body, about the size of a small almond, lying in a depression in the upper and outer part of the orbit. The fluid secreted by it reaches the surface of the eye by seven or eight ducts, which open on the conjunctiva at its upper and outer part. The constant motion of the upper eyelid induces a continuous gentle current of tears over the surface, which carry away any foreign particle that may have been deposited on it. The fluid then passes through two small openings, termed the *puncta lacrymalia*, into the canals; whence its further course into the lower portion of the nose is sufficiently obvious. The conjunctiva (or mucous coat) which covers the front of the eyeball, and lines the inner surface of the lids, passes down and lines the canals, sac, and duct; and is thus seen to be continuous with the nasal mucous membrane, of which it may be regarded as an offshoot or digital prolongation. See **MUCOUS MEMBRANES**.

We shall conclude this sketch of the anatomy of the human eye by a brief notice of the *nerves* going to this organ and its appendages.

Into each orbit there enters a nerve of *special sense*—viz., the optic nerve, a nerve of *ordinary sensation*—viz., the ophthalmic branch of the fifth nerve, and certain nerves of *motion* going to the muscular tissues, and regulating the movements of the various parts—viz., the third, fourth, and sixth nerves.

As the optic tracts from which the *optic nerves* originate are noticed in the article **BRAIN**, we shall merely trace these nerves from their *chiasma* or commissure forwards. This commissure results from the junction of the optic tracts of the two sides; and it is especially remarkable for the fact that it presents a partial decussation of the nervous fibers; the central fibers of each tract passing into the nerve of the *opposite* side, and crossing the corresponding fibers of the other tract, while the outermost fibers, which are much fewer in number than the central ones, pass to the optic nerve of the *same* side. In front of the commissure, the nerves enter the optic foramen at the apex of the orbit, receive a sheath or investment from the *dura mater*, acquire increased firmness, and finally terminate in the retina.

The peculiar mode of termination of the optic nerves in the cup-like expansion of the retina, the impairment or loss of vision which follows any morbid affection of them, and the constant relation in size which is observed in comparative anatomy between them and the organs of vision, afford sufficient evidence that they are the proper conductors of visual impressions to the sensorium.

The first or ophthalmic division of the fifth or trifacial nerve sends branches to the skin of the eyelids and to the conjunctiva. That it is the nerve of ordinary sensation of the eye, is sufficiently obvious from the following facts: (1) That in disease of this nerve in the human subject, it is not uncommon to find the eyeball totally insensible to every kind of stimulus (particles of dust, pungent vapors, etc.); and (2) That if the

nerve be divided in the cranium (in one of the lower animals), similar insensibility results.

The most important of the nerves of motion of the eye is the third nerve, or *motor oculi*. It supplies with motor power the elevator of the upper eyelid, and all the muscles of the globe, except the superior oblique and the external straight muscle, and, in addition to this, it sends filaments to the iris and other muscular fibers within the eye. The application of an irritant (in vivisection experiments) to its trunk induces convulsive contraction of the principal muscles of the ball and of the iris; while division of the trunk occasions an external squint, with palsy of the upper eyelid and fixed dilatation of the pupil. The squint is caused by the action of the external straight and the superior oblique muscles, while the other muscles are paralyzed by the operation. The normal motor action of the nerve upon the iris, in causing contraction of the pupil, is excited through the optic nerve, and affords a good illustration of *reflex action*; the stimulus of light falling upon the retina, and, through it, exciting that portion of the brain from which the third nerve takes its origin. This nerve clearly exerts a double influence in relation to vision: (1) it mainly controls the movements of the eyeball and the upper eyelid; and (2) from its connection with the muscular structures in the interior, it regulates the amount of light that can enter the pupil, and probably takes part in the adjusting power of the eye to various distances.

The fourth nerve supplies the superior oblique muscle with motor power, while the sixth nerve similarly regulates the movements of the external straight muscle—the only two muscles in the orbit which are not supplied by the third pair.

Although not entitled to be termed a nerve of the orbit, the facial nerve deserves mention as sending a motor branch to the *orbicularis* muscle, by which the eye is closed.

2. *Comparative Anatomy of the Eye*.—In *mammals*, the structure of the eye is usually almost identical with that of man. The organ is, however, occasionally modified, so as to meet the peculiar wants of the animal. Thus, in the cetacea, and in the amphibious carnivora that catch their prey in the water, the shape of the lens is nearly spherical, as in fishes, and there is a similar thickening of the posterior part of the sclerotic, so as to thrust the retina sufficiently forward to receive the image formed by such a lens. (See the subsequent remarks on the eyes of fishes.) Again, instead of the dark-brown or black pigment which lines the human choroid, a pigment of a brilliant metallic luster is secreted in many of the carnivora, forming the so-called *tapetum lucidum* at the bottom of the eyeball, which seems (according to Bowman) to act as a concave reflector, causing the rays of light to traverse the retina a second time, and thus probably increasing the visual power, particularly where only a feeble light is admitted to the eye. The pupil, moreover, varies in form, being transversely oblong in the ruminants and many other herbivora, and vertically oblong in the smaller genera of cats. These shapes are apparently connected with the positions in which the different animals look for their food. Lastly, in some mammals (for example, the horse), there is a rudimentary third eyelid, corresponding to the *membrana nictitans* of birds.

In *birds*, the eye, though presenting the same general composition as in man, differs from the mammalian eye in several important points. From our knowledge of the habits of birds (especially birds of prey), we should naturally expect that from their rapid movements they should be able readily to alter the focus between the extremes of long and short sighted vision, and the modifications we shall now proceed to notice clearly have this object in view.

By examining a longitudinal section of the eye of the owl, we see (1) that the shape of the organ is not spherical, as in mammals, nor flattened anteriorly, as in fishes and aquatic reptiles, but that the cornea is very prominent, and the antero-posterior diameter lengthened; the consequence of this arrangement being to allow room for a large quantity of aqueous humor, and to increase the distance between the lens and the posterior part of the retina, and thus to produce a greater convergence of the rays of light, by which the animal is enabled to discern near objects, and to see with a faint light. In order to retain this elongated form, we find a series of bony plates, forming a broad zone, extending backwards from the margin of the cornea, and lying embedded in the sclerotic. The edges of the pieces forming this bony zone overlap each other, and are slightly movable, and hence, when they are compressed by the action of the muscles of the ball, there is protrusion of the aqueous humor and of the cornea, adapting the eye for near vision; while relaxation of the muscles induces a corresponding recession of the humor and flattening of the cornea, and fits the eye for distant vision. The focal distance is further regulated by a highly vascular organ called the *marsupium*, or *pecten*, which is lodged in the posterior part of the vitreous humor. It is attached to the optic nerve at the point where it expands into the retina, and seems to be endowed with a power of dilatation and contraction; as it enlarges, from distension of its blood-vessels, it causes the vitreous humor to push the lens forwards, while, as it collapses, the lens falls backwards again towards the retina.

In addition to an upper and lower eyelid, birds have an elastic fold of conjunctiva, which, in a state of repose, lies in the inner angle of the eye, but is movable by two distinct muscles, which draw it over the cornea. It is termed the *membrana nictitans*; it is to a certain degree transparent, for (according to Cuvier) birds sometimes look through it, as, for example, the eagle when looking at the sun. The lachrymal gland

is situated as in mammals, but there is here a second gland, the *glandula Harderi*, which yields a lubricating secretion.

There are no very special peculiarities in the eyes of *reptiles*, and we therefore proceed to notice the most remarkable points presented by the eye in *fishes*. From the comparatively great density of the medium (water) through which the rays of light pass before they impinge upon the transparent structure of the eye of the fish, it is obvious that this organ must act as a very powerful refractive apparatus. The main peculiarity in the eye of the fish is the size, extreme density, and spherical shape of the lens, which give it such an extraordinary magnifying power that it has been employed as a simple microscope. See Brewster's *Treatise on the Microscope*, p. 81. But its focus being shortened in proportion as its power is increased, it is necessary that the retina should be brought near its posterior surface. For this purpose, the eyeball is flattened by diminishing the quantity of vitreous humor, which being of nearly the same density as the external water, exerts no perceptible power in bringing the rays of light towards a focus; and this flattened form is maintained by the existence of two cartilaginous plates in the tissue of the sclerotic, which in some of the larger fishes is actually converted into a bony cup. The aqueous humor having here no refractive power, is barely sufficient to allow the free suspension of the iris. The pupil is very large, so as to take in as much light as possible, but is generally motionless. Their eyes being constantly washed by the water in which they live, no lachrymal apparatus is necessary, nor does any exist; and the same remark applies to the *cetacea* amongst the mammals. We thus see that throughout the sub-kingdom of the *vertebrata* the eye is constructed according to one general scheme, with modifications to suit the mode of life of individual classes.

In all the above cases, the structure of the eye is essentially the same; that is to say, we have certain dioptric media for collecting the divergent rays to their proper focus on the retina, and we have the means of adjusting the eye for different distances. But if we examine the eyes of insects, we find that they are constructed on different principles.

In these animals, we have *simple* and *compound* eyes usually associated in the same individual. The simple eyes resemble in many respects the corresponding organs in higher animals, but the compound eyes are extremely elaborate and complex in their structure. They are two in number, appearing as hemispherical masses on the sides of the head. When examined with the microscope, their surface is seen to be divided into an enormous number of hexagonal facets, which are in fact corneæ. In the ant, there are only 50 of these facets in each eye; in the common house-fly, 4,000; in butterflies, upwards of 17,000; and in some of the beetles more than 25,000. Each cornea is found to belong to a distinct eye, provided with a nervous apparatus, and exhibiting a lens, iris, and pupil. Strauss Durckheim, who has carefully studied these structures in the cockchafer, suggests that, the eyes of insects being fixed, nature has made up for their want of mobility by their number, and by turning them in all directions; so that it might be said that these little animals have a distinct eye for every object.

Compound eyes of similar structure occur in many of the crustaceans.

3. Having now described the anatomical structure of the eye in man and certain of the lower animals, we are able to proceed to the consideration of the uses of the various parts of this organ. Assuming a general knowledge of the ordinary laws of geometrical optics (see *DIOPTRICS*, *LENS*, etc.), we will trace the course of the rays of light proceeding from any luminous body through the different media on which they impinge. If a luminous object, as, for example, a lighted candle, be placed at about the ordinary distance of distinct vision (about 10 in.) from the front of the eye, some rays fall on the sclerotic, and being reflected, take no part in vision; the more central ones fall upon the cornea, and of these some also are reflected, giving to the surface of the eye its beautiful glistening appearance; while others pass through it, are converged by it, and enter the aqueous humor, which probably exerts no perceptible effect on their direction. Those which fall on and pass through the outer or circumferential part of the cornea are stopped by the iris, and are either reflected or absorbed by it; while those which fall upon its more central part pass through the pupil, and are concerned in vision. In consequence of its refractive power, the rays passing through a comparatively large surface of the cornea are converged so as to pass through the relatively small pupil and impinge upon the lens, which, by the convexity of its surface, and by its greater density towards the center, very much increases the convergence of the rays passing through it. They then traverse the vitreous humor, whose principal use appears to be to afford support to the expanded retina, and are brought to a focus upon that tunic, forming there an exact but inverted image of the object.

This inversion of the image may be easily exhibited in the eye of a white rabbit or other albino animal, after removing the muscles, etc., from the back part of the globe. The flame of a candle held before the cornea may be seen inverted at the back of the eye, increasing in size as the candle is brought near, diminishing as it retires, and always moving in a direction opposite to that of the flame.

The adaptation of the eye to distinct vision at every distance beyond that of a few inches, is extremely remarkable, and numerous attempts have been made to explain the mechanism by which its focal length admits of alteration under the influence of the will. One view that has met with much support is, that the focal length is modified by a slight movement of the lens. In the eye of the bird there is a structure termed the

ciliary muscle, which obviously approximates the lens to the cornea when a short field of view is required, and although the corresponding structure is only slightly developed in man and mammals, it is probably sufficiently strong to produce the slight action required; while for the vision of distinct objects the lens is carried back towards the retina by the elasticity of the connecting tissues. It would appear however, from the recent researches of Cramer, Helmholtz, Allen Thomson, and others that the accommodation is effected rather by a change in the *form* than in the *position* of the lens. It has been experimentally proved, that when the eye is turned from a distant to a near object, the antero-posterior diameter of the lens becomes elongated, and the anterior surface becomes more convex, while the opposite changes take place in turning the eye from a near to a distant object. According to Helmholtz, the radius of curvature of the anterior surface of the lens diminishes on turning the eye to a near object from ten to six millimeters (from about 0.4 to 0.24 of an in.), while the most projecting point of the same surface is brought forward about 0.2 of an inch.

Whichever view be adopted, the ciliary muscle takes an active part in the process. According to the observations of Hueck, the focal distance may be changed about three times in a second. The accommodation from a near to a distant object is effected much more rapidly than the converse process.

There are two well-known forms of defective vision in which this power of adaptation is very much limited—viz., short-sightedness or *myopia*, and long-sightedness or *presbyopia*. The limitation, however, is not due to a defect in the muscular apparatus to which we have referred, but to an abnormality either in the curves or in the density of the refracting media. In *short-sightedness* from too great a refractive power from either cause, the rays from objects at the ordinary range of distinct vision are brought too soon to a focus, so as to cross one another, and begin to diverge before they fall on the retina; the eye in this case being able to bring to the proper focus on the retina only those rays which were previously diverging at a large angle from a very near object. The correction for this deficiency is accomplished by interposing between the eye and indistinctly-seen objects a *concave* lens, with a curvature just sufficient to throw the images of external objects at the ordinary distance of distinct vision backwards upon the retina. In *long-sightedness*, on the other hand, there is an abnormal diminution of the refractive power from too flat a cornea, a deficient aqueous humor, or a flattening of the lens, so that the focus is behind the retina. This defect is corrected by *convex* lenses, which increase the convergence of the rays of light. Long-sightedness, as its name *presbyopia* indicates, usually comes on at a comparatively advanced period of life, while short-sightedness is most commonly met with in young persons; but both these rules present occasional exceptions; and the common belief that the latter affection naturally disappears after the middle period of life, is altogether erroneous.

We have already noticed the most essential use of the iris—viz., its power, under the influence of light upon the retina, of modifying the size of the pupil, so as to regulate the amount of light entering the eye. But this is not its only use; one of its offices being to prevent the passage of rays through the circumferential part of the lens, and thus to obviate the indistinctness of vision which would arise from *spherical aberration* (the unequal refraction of the rays passing through the center and near the margin of the lens), in the same manner as the diaphragms employed by the optician. But there are additionally two other means by which this spherical aberration is prevented, which so well illustrate the wondrous mechanism of the eye, that we cannot omit to notice them. They are described by Prof. Wharton Jones as follows:

(1.) "The surfaces of the dioptric parts of the eye are not spherical, but those of the cornea and posterior surface of the lens are hyperbolic, and that of the anterior surface of the lens elliptical—configurations found by theory fitted to prevent spherical aberration. This discovery was made at a time when it was not known but that the dioptric parts of the eye had spherical surfaces.

(2.) "The density of the lens diminishing [as we have already shown] from the center to its periphery, the circumferential rays are less refracted than they would have been by a homogeneous lens with similar surfaces. This elegantly simple contrivance has been hitherto inimitable by human art."—*The Actonian Prize Treatise*, 1851, p. 50.

Chromatic aberration, which is caused by the unequal refrangibility of the primitive rays of which white light is composed, when transmitted through an ordinary lens, whereby colored fringes are produced, is *practically* corrected in the eye, although it is doubtful whether it is *entirely* absent. The provision, however, on which the achromatism depends has not been determined with certainty, probably because we do not yet know the relative refractive and dispersive powers of the cornea and humors of the eye. Sir David Brewster denies that the chromatic aberration receives any correction in the eye, and maintains that it is imperceptible only in consequence of its being extremely slight.

4. We have hitherto been considering the eye as an optical instrument which projects pictures of external objects on the retina; we now come to the action of the nervous tunic, the *retina*, and its adaptation to the physical construction of the eye.

When the retina or the optic nerve is stimulated, we have the sensation of light, whatever may be the nature of the stimulus employed—as, for example, if it be a

blow on the eye in the dark, or irritation of the optic nerve from some morbid condition. The sensation of light, then, consists in a recognition by the mind of a certain condition of these nervous structures, and this condition may be induced by the application of any stimulus; the ordinary stimulus obviously being the rays of light which fall upon the retina. There must, however, be a certain amount of light for the purpose of vision. Every one knows that it is difficult and painful to discern objects in a very faint light; and on the other hand, that on suddenly entering a brilliantly lighted room from the dark, everything appears confused for one or two seconds. There is, however, a gradual adaptation of the retina to different amounts of light. Persons long immured in dark dungeons acquire the power of distinctly seeing surrounding objects; while those who suddenly encounter a strong light, are unable to see distinctly until the shock which the retina has experienced has subsided, and the iris has duly contracted. In protecting the retina from the sudden effects of too strong a light, the iris is assisted by the eyelids, the obicular muscle, and, to a certain extent, by the eyebrows. Moreover, the dark pigment of the choroid coat acts as a permanent guard to the retina, and where it is deficient, as in albinos, an ordinary light becomes painful, and the protective appendages, especially the eyelids, are in constant use.

The persistence, during a certain time, of impressions made on the retina, facilitates the exercise of sight. A momentary impression of moderate intensity continues for a fraction of a second; but if the impression be made for a considerable time, it endures for a longer period after the removal of the object. Thus a burning stick, moved rapidly in a circle before the eyes, gives the appearance of a continuous ribbon of light, because the impression made by it at any one point of its course remains on the retina until it again reaches that point. It is owing to this property that the rapid and involuntary act of winking does not interfere with the continuous vision of surrounding objects; and, to give another illustration of its use, if we did not possess it, the act of reading would be a far more difficult performance than it now is, for we should require to keep the eye fixed on each word for a longer period, otherwise the mind would fail fully to perceive it. Again, in consequence of the retention of sensations by the retina, the image of an object may continue to be seen, especially in certain morbid states of the system, and in twilight, for some seconds after the eyes have been turned away from it, and this physiological phenomenon has probably given origin to many stories of ghosts and visions. Thus, if a person has unconsciously fixed his eyes, especially in the dusk, on a dark post or stump of a tree, he may, on looking towards the gray sky, see projected there a gigantic white image of the object, which may readily be mistaken for a supernatural appearance. These ocular spectra are always of the complementary color to that of the object. Thus, the spectrum left by a red spot is green; by a violet spot, yellow; and by a blue spot, orange. However great may be the velocity of a luminous body, it can always be seen; but if an opaque body move with such rapidity as to pass through a space equal to its own diameter in a less time than that of the duration of the retinal impression, it is altogether invisible; and hence it is, for example, that we cannot see bullets, etc., in the rapid part of their flight.

A small portion of the retina, corresponding to the entrance of the optic nerve, is incapable of exciting the sensation of vision when it receives the image of an object. According to Volkmann, this small invisible spot exactly corresponds in size with the artery lying in the center of the optic nerve. If the "blind spot" had been situated in the axis of the eye, a blank space would always have existed in the center of the field of vision, since the axes of the eyes in vision correspond. But as it is, the blind spots do not correspond when the eyes are directed to the same object; and hence the blank which one eye would present is filled up by the other eye. Mariotte, early in the last century, first described the existence of these blind spots. Any one may satisfy himself of their existence by the following simple experiment. Let two small black circles be made upon a piece of paper, about four or five inches apart, then let the left eye be closed, and the right eye be strongly fixed upon the left-hand circle. If the paper be then moved backwards and forwards, a point will be found at which the right-hand circle is no longer visible, although it reappears when the paper is either brought nearer or removed further. Although no other part of the retina possesses the complete insensibility presented by the blind spot, it is probable that its anterior portions have very little to do with vision. When using only one eye, we direct it towards the object we wish to inspect, in such a way as to throw the image to the back of the globe; and when the eye is thus fixed, objects near the boundary of the field of vision are less distinctly seen than those at its center.

The extent of the field of vision for a single eye, the head being fixed, has been calculated by Dr. Young. He found that the eyeball was capable of a movement of 55 degrees in every direction, so that a single eye may have perfect vision of any point within a range of 110 degrees.

We have not yet referred to the longitudinal range, or greatest distance of human vision; indeed, this range varies so extremely that it is difficult to assign an arbitrary limit to it. Many uncivilized races, as the North American Indians, and the inhabitants of the vast Asiatic steppes, possess powers of sight which would appear almost incredible if they had not been thoroughly and frequently corroborated. Our information is more definite regarding the limits of human vision in regard to the minuteness of the

objects of which it can take cognizance. Ehrenberg has carefully studied this subject; and has arrived at the following results. The side of the smallest square magnitude usually visible to the naked eye—either of white particles on a black ground or conversely—is about $\frac{1}{415}$ th of an inch; and with the greatest condensation of light and effort on the part of the observer, squares with a side as small as $\frac{1}{815}$ th of an inch may be recognized, but without sharpness or certainty. Bodies smaller than these, when observed singly, cannot be discerned by the *naked* eye, but may be seen when placed in a row. Much smaller particles may, however, be distinctly seen, if they powerfully reflect light; thus, gold-dust, which in none of its diameters exceeded $\frac{1}{1125}$ th of an inch, is easily discernible in common daylight. The delicacy of vision is far greater for lines than for minute areas, since opaque threads of $\frac{1}{4500}$ th of an inch may be discerned when held towards the light.

Various topics which the reader might perhaps have expected to find noticed, such, for instance, as “single vision with two eyes,” “the appreciation of solid forms by the sense of vision,” “correct vision with an inverted image on the retina,” etc., which belong fully as much to metaphysics as to physiology, are discussed in the article on VISION. We may also refer those who desire information on these points to Prof. Bain’s treatise on *The Senses and the Intellect*.

EYE, DISEASE OF THE. The diseases of the eye enumerated by the surgeon are very numerous, partly from the variety of the tissues and parts of which it is formed, partly because the exposed situation and transparency of the eye enable the diseases to be seen. Nearly all its parts are liable to inflammation and its consequences. See OPHTHALMIA. The eyelids are liable to various diseases, as growths of several kinds, most of which the surgeon may remove; inflammation, as *blear-eye* (ophthalmia tarsi); to be misdirected inwards or outwards, *entropion* and *ectropion* (q.v.); and the upper eyelid may fall down (ptosis) from palsy of the common motor oculi nerve. The eyelashes may grow in upon the eye (trichiasis), and produce serious results. When plucked out, they grow again; and if they still grow in upon the eye after this palliative treatment has been tried several times, the surgeon has to cut down on their roots, and destroy them. The duct which conveys away the tears to the nose is liable to inflammation and obstruction, causing watery eye. See LACHRYMAL ORGANS. The cornea is liable to opacity in various degrees. The mere *nebula* or cloudy condition, either limited or general, may pass off, and leave the cornea again clear; but the white mark, which is the cicatrix or scar of an ulcer, is permanent, although it may become smaller by the disappearance of the surrounding haze. The pupil may be closed as the result of iritis, or of operations for cataract, and an artificial pupil may be made by either of the three methods—incision, excision, or separation—but the operation is seldom attended with success. For opacities of the crystalline lens, see CATARACT. For an account of diseases of the nervous parts of the eye, see AMAUROSIS. Various affections of vision may arise from peculiar or altered conditions of the refracting humors of the eye—as near-sightedness (myopia), far-sightedness (presbyopia), the appearance of bodies (muscæ) floating in or before the eye; and there may be double vision (diplopia), with two eyes or with one. See VISION. The parts between the eye and its bony orbit may be the seat of inflammation, abscess, or tumor, making the eye protrude. The movements of the eyeballs may be affected from palsy of the motor nerves, or from contraction of the lateral recti muscles, causing inward or outward squinting. See SQUINTING. The eye may lose all feeling, from palsy of the fifth pair of nerves. The whole of the same side of the face, nostril, and mouth, will be in the same condition, and the eye becomes inflamed and disorganized. Substances thrown against the eye may injure it. Quicklime is rapidly destructive to the eye, slaked lime and mortar less so. When one of these, or any other caustic, has got into the eye, sweet oil is the best thing to introduce, until the surgeon arrives to remove them. If it is oil of vitriol (sulphuric acid) that has been the cause of the injury, a weak solution of soda may be used in the first place to neutralize the acid. In gunpowder explosions near the eye, besides the burn, the particles are driven into the surface of it, and will cause permanent black stains over the white of the eye, unless they are carefully removed at the time. When chips of glass, stone, etc., are driven into the interior of the eye, there is little hope of it being saved from destructive inflammation. When only partially sunk into the cornea, as is often the case with sparks of hot iron, or “fires,” as they are called, the rubbing of the projecting part on the eyelid causes great pain, and the surgeon has not much difficulty in removing them. Most commonly these, or other “foreign bodies,” as particles of dust, sand, seeds, flies, etc., merely get into the space between the eyeball and the lids, almost always concealed under the upper, as it is the larger, and sweeps the eye. They cause great pain, from the firmness and sensitiveness of the papillary surface of the lid, soon excite inflammation, and their presence, as the cause, is apt to be overlooked. The lid must be turned round to find them. To do this, pull the front or edge of the lid forwards by the eyelashes, held with the finger and thumb, and at the same time press down the back part of the lid with a small pencil or key. The lid will readily turn round, when the body may be seen about its middle, and may be removed with the corner of a handkerchief. Another plan, which the person himself may try, is to pull forward the upper lid by the eyelashes, and push the lashes of the lower lid up behind

it, when the foreign body may be brushed out. After the bodies are removed, a feeling as if they were still there may remain for some time.

EYEBRIGHT, *Euphrasia*, a genus of plants of the natural order *scrophulariaceæ*, having a tubular calyx, the upper lip of the corolla divided, the lower of three nearly equal lobes, the cells of the anthers spurred at the base, a two-celled capsule and striated seeds. Some of the species are root-parasites. The only British species is the COMMON E. (*E. officinalis*), a little plant of at most 6 or 8 in. in height, with ovate serrated leaves, and white or reddish flowers streaked with purple, appearing singly in the axils of the leaves. It is very abundant in many pastures, and even on high mountains, where—as in very northern regions—it is often to be seen of only an inch in height, gemming the ground abundantly with its bright little flowers. It is a very widely distributed plant, a native of most parts of Europe, the n. of Asia, the Himalaya, etc. It was once in great repute as a cure for ophthalmia, and is still much used in rustic practice for diseases of the eye. A spot on the corolla, something like a pupil, gave it much of its reputation, whilst the fanciful doctrine of *signatures* prevailed in medicine; but it has been found really efficacious in catarrhal inflammations of the eye, and in other catarrhal affections. It is a weak astringent. It is the *euphrasy* of Milton, with which he represents the archangel Michael as *purging the visual nerve* of Adam.

EYE-PIECE, the name given to the microscope by means of which the image of the object formed in the focus of a telescope is observed. See TELESCOPE.

EYLAU, usually called Prussian Eylau, a t. in the government of Königsberg, and 22 m. s. of the town of that name, contains about 3,600 inhabitants, and is celebrated for the battle fought there between Napoleon and the allies—Russians and Prussians—under Bennigsen, Feb. 8, 1807. The French force amounted to about 70,000, and the allies had fewer troops, but were superior in artillery. The battle was opened soon after daylight by a furious attack made by the French left on the Russian right and center, which, however, proved utterly unsuccessful, the attacking corps being all but completely destroyed. The murderous struggle was repeatedly renewed, and the promise of victory alternated now to the one side and now to the other. Night closed upon the whole allied line pressing onward and driving the French before them. Nevertheless, the victory is generally claimed by the latter, chiefly because the allied forces, unable to recruit their strength, were ordered to retreat from the field on the night of the battle, and to retire upon Königsberg. The loss on each side is estimated at about 18,000.

EYRE, EDWARD JOHN, a distinguished explorer and colonial governor, was the son of an English clergyman in Yorkshire, and was b. in 1815. Emigrating to Australia at the age of seventeen, he was prosperous as a squatter, and soon became a magistrate. In 1840 he failed in an attempt to explore the region between south and western Australia—a task he accomplished, in spite of enormous difficulties, in 1841. In 1846 he became lieut.-gov. of New Zealand, and in 1852, of St. Vincent. In 1862 he was appointed governor of Jamaica, where in 1865, negro disturbances broke out. E., resolving on prompt measures, proclaimed martial law; a Mr. Gordon, believed to have had a leading part in the rising, was hurriedly tried by court-martial, and hanged two days after, the sentence having been confirmed by Eyre. A commission sent to inquire into this case, found that Gordon had been condemned on insufficient evidence, and E. was recalled. On his return he was prosecuted for murder by a committee, of whom J. Stuart Mill was the most prominent; Mr. Carlyle and sir R. Murchison promoted the E. defense fund. The charge of murder was dismissed by the magistrates of Market Drayton in 1867. In 1874 he was pensioned and retired from public service.

EYE-STONE, a small calcareous stone found in some shellfish, which was formerly much used, and is still to some extent, to remove foreign substances from the eye. It is put under the lid, and from its lentiform shape is easily moved around by the motion of the eye, and dust or cinders adhering to it are taken out with it.

EYE TEETH, also called *canine* or *cuspidate* teeth, the two teeth in the upper jaw next to the grinders, the fangs of which extend far upwards in the direction of the eye. See also CANINE TEETH.

EZEKIEL (meaning “God will strengthen,” or “strength of God”), one of the Hebrew prophets, was the son of the priest Buzi, and along with Jehoiachin, king of Judah, was carried captive, when still a young man, to Mesopotamia, by order of Nebuchadnezzar, about 598 B.C. He was a member of the Jewish community which settled on the banks of the river Chebar, and first appeared as a prophet about the year 594 B.C. His prophetic career extended over a period of 22 years. The date of his death is not recorded.—The book of Ezekiel consists of three parts: the *first* (chaps. i.–xxiv.), composed before the final conquest of Jerusalem by Nebuchadnezzar, announces the complete overthrow of the kingdom of Judah, on account of its increasing unfaithfulness to God; the *second* (chaps. xxv.–xxxii.) threatens the surrounding nations, which were exulting maliciously over the ruin of Judah, with divine punishment; and the *third* (chaps. xxxiii.–xlvi.) prophesies the future deliverance of the Hebrew nation, and the rebuilding of Jerusalem. This last portion is generally believed to contain several Messianic predic

tions, three of which are considered specially remarkable (chaps. xxxvi.-xxxvii., xxxviii.-xxxix., and xl.-xlviii.); and it is beyond all question that only under a world-wide dispensation like the Christian, can the glorious visions of the prophet receive a historical realization. The book is full of magnificent but artificial symbolism, and of allegories difficult to understand; whence Jerome calls it "a labyrinth of the mysteries of God;" but here and there, as in chapters 1st and 2d, it contains visions that indicate the possession on the part of E. of a most vivid and sublime imagination. E.'s authorship of the book has been questioned. The Talmud says, it was written by the great synagogue, of which E. was not a member; and Ewald, believing that traces of later elaboration are quite obvious, suggests that the collection and combination of the various prophecies into a book may not have been the prophet's own doing. The opinion of most critics, however, is, that a prophet who was so much of a literary artist as E., was more likely to have completed the book himself than to have left such a work to others. The text is far from being in a perfect condition. It is partly corrupted by glosses, has partly been retouched by later hands, and may often be amended by the Septuagint version. The best commentaries on the book of Ezekiel are those of Hävernicks (Erlangen, 1843) and Hitzig (Leip. 1847).

EZEKIEL, BOOK OF (see EZEKIEL), consists of an *introduction* (chapters i.-iii.) reciting the glorious vision in the midst of which Ezekiel received his call to the prophetic office, his commission to Israel, and his encouragements from God; and *three principal parts*.

I. PROPHECIES AGAINST THE PEOPLE OF ISRAEL (chapters iv.-xxiv.), subdivided into 18 sections. 1. The siege of Jerusalem, represented by a picture drawn on a tablet; the prolonged transgressions of the people, by the prophet's continued reclining on his side; and the hardships they should suffer, by the eating of coarse and loathsome bread. 2. Judgments on the city by famine, war, and dispersion abroad, signified by hair and beard cut off, weighed, scattered, and burned. 3. Judgments against idolatry, with a promise that a remnant should be saved. 4. Captivity, inevitable and severe, under the emblem of a chain. 5. Transgressions of Judah, represented by the image of jealousy; and consequent judgments, typified by the scattering of fire, and the departure of the shekinah. 6. The captivity of Zedekiah, represented by the removal of household goods, and bread eaten with trembling. 7. False prophets reprov'd and threatened. 8. Idolatrous elders condemned. 9. The rejection of Jerusalem, represented by the burning of an unfruitful vine. 10. God's compassionate love, against which Israel had sinned, compared to kind care shown to a child cast out at its birth. 11. Judgments on Israel for turning to Egypt for help against Babylon, denounced under the emblem of two great eagles, one representing Nebuchadnezzar, and the other Pharaoh. 12. Judgment denounced on every transgressor for his own sins, contrary to the common proverb implying that children suffer for their fathers' faults. 13. Captivity of the Jewish kings, represented by lions pursued and captured, and of the Jewish people, by a vine scorched, torn up, and planted in the wilderness. 14. God's mercies to Israel, and their continued transgressions reviewed; and, while final forgiveness is promised to the penitent, impending judgments are declared. 15. A consumed forest represents Jerusalem destroyed, and a sharp sword, Nebuchadnezzar cutting down Ammonites and Jews. 16. Recital of sins committed in Jerusalem by all classes of the people, and judgments on them denounced. 17. Idolatries of Samaria and Jerusalem, and their punishment. 18. Dreadful destruction of Jerusalem again proclaimed.

II. PROPHECIES AGAINST VARIOUS NATIONS AROUND JUDEA (chapters xxv.-xxxii.), subdivided into three sections. 1. Against the Ammonites, Moabites, Edomites, and Philistines. 2. Against Tyre (represented, in its beauty, wealth, and renown, as the anointed cherub on the mountain of God) with a promise of returning prosperity to Israel. 3. The destruction of Egypt foretold and illustrated by a recital of Assyria's glory and fall under the emblem of a cedar of Lebanon cut down.

III. PROMISES OF FUTURE DELIVERANCE TO ISRAEL (chapters xxxiii.-xlviii.) subdivided into 6 sections. 1. The prophet is compared to a watchman appointed to give warning of danger, and is exhorted to be faithful. While under the power of the prophetic spirit, being informed that Jerusalem had been taken by Nebuchadnezzar, he foretells the desolation of the land, and reproves the hypocrisy of the captives around him. 2. The rulers, civil and ecclesiastical, condemned as unfaithful shepherds, and a general restoration of the people promised under the guidance of the good shepherd, David the prince. 3. Judgments against Edom again foretold. 4. Promises of restoration renewed to Israel, under the emblems of fruitful mountains, sprinkled water, a new heart, dry bones raised to life, and two sticks united together. 5. Destruction of Gog and Magog, followed by blessings to Israel. 6. Vision of the temple, the returning glory of the Lord, the division of the land, the healing waters from the sanctuary, the portions of the tribes, the city with 12 gates whose name shall be, "The Lord is there."

EZION-GABER, OR EZION-GEGER, the last station of the Israelites before coming to "the wilderness of Zin, which is Kadesh." It was subsequently the station of Solomon's navy; that at which Jehoshaphat's ships were broken. This port, of which no trace remains, is supposed to have been at the modern Ain-el Ghudyan, about 10 m. up the dry bed of the Arabah, and near Elath, or Berenice.

EZRA, a Jewish lawgiver of the 5th c. before Christ. He was descended from a distinguished priestly family, and was resident in Babylon in the reign of Artaxerxes Longimanus. With this monarch he seems to have been in considerable favor, and in the year 478 B.C. obtained permission to return to Jerusalem with a band of his countrymen amounting to 1754. His services to the new colony in regard to their civil and religious condition were very important. He endeavored to reimpose more strictly the law of Moses forbidding marriages with heathen women, and disannulling such ties where they had been formed. He also introduced into Jewish literature the square Chaldee character, instead of the old Hebrew or Samaritan one, which had been customary till then; but the tradition that he rewrote from memory the sacred books burned at the destruction of the temple, deserves no regard; and it is likewise a mere tradition that as president of the so-called great synagogue (an assemblage of Jewish scholars) he arranged and completed the canon of the Old Testament. See **BIBLE**.—The book called by his name, along with the book of Nehemiah, formed, among the Jews, the first and second books of Ezra. It records events which extended over a period of nearly 80 years, and divides itself naturally into two parts. The first six chapters embrace a period of 21 years, and relate the history of the first return from the Babylonish captivity; the rest of the book chronicles the *second* return under Ezra the priest, in the reign of Artaxerxes Longimanus. The book is partly written in Chaldee, and is probably the work of various authors.

EZRA, **BOOK OF** (see **EZRA**), records portions of Jewish history after the captivity. It is divided into two parts, the first of which, comprising six chapters, contains: 1. The decree of Cyrus giving permission to the Jews to return to their own land and rebuild their temple. 2. The record of his restoration of the sacred vessels of silver and gold (numbering in all 5,400) which Nebuchadnezzar had taken from the temple and brought to Babylon. 3. The return of a portion of the people and their commencement of the work. 4. The obstacles placed in their way by men who had taken possession of the land, and, consequently, did not wish the Jews to be re-established in it. 5. When this opposition had continued more than 20 years, Darius Hystaspis, having found the decree of Cyrus, confirmed it and gave the Jews additional privileges and help by which they were enabled to complete their temple and re-establish divine worship. After an interval of nearly 60 years, the second part, comprising four chapters, contains: 1. The decree of Artaxerxes giving Ezra authority to proceed to Jerusalem, with all Jews who wished to accompany him, and re-establish the Jewish state. On this occasion, the king, with his counselors, added large sums of silver and gold to the free-will offerings of the people, and also directed his treasurers in the provinces intervening between Babylon and Jerusalem to furnish the expedition liberally with needed supplies. 2. The arrival of Ezra accompanied by about 1500 chief men and 200 priests and Levites. 3. The reconstruction of the religious and social state of the Jews in accordance with the law of Moses. This reformation included the very difficult work of annulling the marriages which many had made with heathen families of the land. The Jews have always maintained the canonical authority of this book, giving it an equal place with the Pentateuch, and comparing Ezra with Moses. Ezra is justly regarded as the author of the whole book, although in the first part, relating to the actions of others; he drew his materials from various sources; in the second part only he describes events in which he was an eye-witness, a prominent actor, and the chief director.

F

F, **THE** sixth letter in the Latin and English alphabets; corresponding to the *vau* of the Hebrew, and the *digamma* (q.v.) of the old Greek alphabet. See **ALPHABET**.

F and *v* are called *labio-dentals*, from the organs employed in producing them; they belong to the class of consonants called aspirates (q.v.), and bear the same relation to each other that exists between the unaspirated labials *p* and *b*. In Latin, *f* had a peculiar sound, different from that of Greek *φ*, as we learn from Cicero and other Latin writers. What the sound was, we do not exactly know, but it approached to the nature of a strongly breathed *h*, as is indicated by the fact, that in the Sabine dialect it sometimes takes the place of *h*, as Sab. *fircus* = Lat. *hircus* (a he-goat); and the Latins made use both of *faba* and *haba* for "a bean." This affinity is also shown in modern Spanish, where *h* takes the place of the Latin *f*; as Lat. *femina*, Sp. *hembra*; *fl* becomes, in Spanish, *ll*, as Lat. *flamma* = Sp. *llama*. *F*, in English and other Teutonic tongues, corresponds to *p* in Greek and Latin; as Lat. and Gr. *pater* = Eng. *father*; Gr. *pod-*, Lat. *ped-* = Eng. *foot*; Lat. *pisc-* = Eng. *fish*; Gr. *pur* = Eng. *fire*; Lat. *vulp-* = Eng. *wolf*. In some words, *v* takes the place in German of *f* in English; as Ger. *vater* = Eng. *father*; Ger. *vier* = Eng. *four*. In the Aberdeenshire dialect, *f* takes the place of *wh*, as *fat* for *what*; *fup* for *whip*. This seems to be a relic of the Teutonic pronunciation of *w* (= *v*), still to be observed in the Cockney pronunciation of *vill* for *wick*, *ven* for *when*; but why the sharpening of the labial into *f* should be confined to one circumscribed district of Scotland, and to the case of *w* followed by *h*, it is hard to say.

F in Lat. and Greek becomes *b* in Eng.; as Gr. and Lat. *fer* = Eng. *bear*; Lat. *frater* = Eng. *brother*. See Letter B.

More remarkable are the interchanges between *f* and the series *d, th, t*. Lat. *foris* = Gr. *thura*, Eng. *door*; Lat. *fera* = Gr. *ther*, Eng. *deer*; Eng. *red*, Sans. *ruthira*, Gr. *eruthros*, Lat. *rutilus, rufus, ruber*. In Russian, *Feodor, Afanasja* = *Theodor, Athanasia*. In words originally common to both Greek and Latin, the Greek *φ* is represented in Lat. by *f*; as Gr. *φῆμη* = Lat. *fama*. But in spelling Greek words with Latin letters, the Romans, after the time of Cicero, were careful to represent *φ*, not by *f*, which had a somewhat different power, but by *ph*. This mode of spelling words derived from Greek is still adhered to in English, German, and French, although the distinction in sound has long been lost sight of. The distinction began to disappear in the Latin itself in the time of the later Roman emperors, when inscriptions show such spelling as *Afrodite* for *Aphrodite*; and this simplification is followed in modern Italian, Spanish, and Portuguese. *Ph* is sometimes erroneously used in words having no connection with Greek; as Adolphus, for the Teutonic Adolf or Adalolf—i.e., “noble wolf.”

F, in music, is the fourth note of the natural diatonic scale of C, and stands in proportion to C as 4 to 3, and is a perfect fourth above C as fundamental note. F major, as a key, has one flat at its signature—viz., B flat. F minor has four flats the same as A flat major, of which it is the relative minor.

F'S, THE THREE. See IRISH LAND LAWS.

FAAM, or **FAHAM** (*angræcum fragrans*), an orchid, native of India and the Mascarene isles, much prized in the east for the delightful fragrance of its leaves, which is owing to the presence of *coumarin* (q. v.), and resembles that of the tonka bean and of vernal grass. In the isle of Bourbon, an infusion of F. leaves is in great repute as a cure for pulmonary consumption and as a stomachic. In France, it has been successfully employed, under the name of *isle of Bourbon tea*, as an expectorant, anti-spasmodic, and stomachic.

FABACEÆ. See LEGUMINOSÆ.

FABER is the name of two artists, father and son. John F., the elder, was b. in Holland, where he acquired a knowledge of the art of mezzotint-engraving. Subsequently, he went to England, and died at Bristol, May, 1721. His works do not exhibit much talent.—The younger F., also called John, obtained, however, a high reputation as an engraver in mezzotint. His principal works are the portraits of the Kit-cat club, and the beauties of Hampton court, several of which are executed with great freedom, vigor, and beauty. F. lived in London, where he is believed to have died in 1756.

FABER, CECILIA BÖHL VON, 1797-1877; a celebrated novelist of Spain, better known by her masculine pseudonym of FERNAN CABALLERO. She was educated in Spain and Germany, and became an accomplished linguist. In 1813, she returned to Cadiz, and the next year married capt. Planells, whom she accompanied to America, where she passed a number of years of her married life. Not long after the death of her first husband she was married to the marquis de Arco Hermoso, and was a frequent attendant at the Spanish court, where her beauty, vivacity, and wit were much admired. Her second husband died in 1835, and in 1837 she married señor de Arrom, a member of the bar. The union was unfortunate, and it is to the trials and disappointments of her later life that the world is indebted for her literary works. Washington Irving visited her, and encouraged her to pursue Spanish literature, but it was many years later before *The Family of Alvarado*, her first work, was given to the public, nor was it until after her 50th year that she appeared as an author at all, and then under an assumed name. Her works soon became popular, and were translated into French and German, so that within ten years she gained a European reputation. A collected edition in 13 vols. was issued from the Madrid press in 1859, and about the same time she was appointed governess of the royal children. Among the many schemes of her busy life was one for the prevention of cruelty to animals.

FABER, FREDERICK WILLIAM, D.D., 1814-63; b. England; educated at Oxford. He gave up his Calvinist views and became an enthusiastic admirer and follower of John Henry Newman. In 1841, he traveled on the continent, and recorded his observations in *Sights and Thoughts in Foreign Churches and among Foreign Peoples*. In 1845, he was converted to the Roman Catholic faith, and founded a religious community at Birmingham, called Wilfridians, after the name Wilfrid, which he had assumed. This community was ultimately merged in the oratory of St. Philip Neri, of which Newman was the head; and in 1849 a branch was established in London over which Faber presided till his death. He published a number of theological works, and edited the *Oratorian Lives of the Saints*, but it is mainly as a writer of fervent and deeply tender devotional hymns that he is known.

FABER, Rev. GEORGE STANLEY, a learned and voluminous divine of the Anglican church, was the eldest son of the Rev. Thomas Faber, and was b. 25th Oct., 1773. He entered university college, Oxford, in 1789, where he achieved a brilliant academical reputation. Before his 21st year, he was elected fellow and tutor of Lincoln college.

In 1796, he took his degree of M.A.; was Brampton lecturer for 1801, in which capacity he delivered the lectures subsequently published under the title of *Horæ Mosaicæ*; and in 1805 became vicar of Stockton-on-Tees, in the country of Durham. After several changes, he received from bishop Van Mildert, in 1832, the mastership of Sherburn hospital, near the city of Durham, where he died 27th Jan., 1854. F. wrote upwards of forty works, several of which, especially those upon prophecy, have enjoyed a very extensive popularity. All his writings are marked by "strong masculine sense, extensive classical erudition, and a hearty love of hypothesis." The principal are—*The Genius and Object of the Patriarchal, the Levitical, and the Christian Dispensations* (1823, 2 vols.); *The Difficulties of Infidelity* (1824); *The Sacred Calendar of Prophecy* (1828, 3 vols.); *The Primitive Doctrine of Election* (1836), reckoned by some critics the most valuable of all F.'s writings; *The Primitive Doctrine of Justification* (1837); and *Eight Dissertations upon the Prophetic Promises of a Mighty Deliverer* (1845, 2 vols.).

FABER, OR LEFÈVRE, JACOBUS, 1450–1536; surnamed STAPULENSIS; b. Picardy; a pioneer of the Protestant movement in France. He was a graduate of the university of Paris, and professor in the college of cardinal Lemoine. Though his works were very obnoxious to the Roman church he was safe from persecution under the king's protection until the king was taken prisoner at the battle of Pavia. He was then formally condemned, and his works were suppressed; but on the return of Francis all such proceedings were stopped. Among his works were the *Physics, Metaphysics, and Ethics of Aristotle*; and *A Psalter* in five languages. In 1512, he issued a translation into French of the Epistles of St. Paul, and of the whole New Testament in 1523, of the Pentateuch in 1528, and in 1530 of the whole Bible. His work has been the basis of all subsequent French versions. He also published notes and comments constantly exalting the Bible above the church as the rule for human conduct. When the princess Margaret became queen of Navarre, she gave Faber an asylum beyond the reach of his persecutors, where he passed his old age in quiet.

FABIAN GENS. See **FABIUS**.

FABIUS, the name of one of the oldest and most illustrious patrician families of Rome. Three brothers of this name alternately held the office of consul for seven years (485–479 B.C.). In 479, the Fabii, under K. Fabius Vibulanus, migrated to the banks of the Cremera, a small stream that flows into the Tiber a few miles above Rome. Here, two years after, they were decoyed into an ambuscade by the Veientes, with whom they had been at war, and, with the exception of one member, who had remained at Rome, and through whom the race was perpetuated, the entire gens, consisting of 306 men, were put to the sword. The most eminent of the Fabii were Quintus Fabius Rullianus—supposed to have been the first who obtained for himself and his family the surname of *Maximus*—and his descendant, Quintus Fabius Maximus Verrucosus, named Cunctator, the delayer. The former was the most eminent of the Roman generals in the second Samnite war, and was twice dictator, and six times consul. The later, who, in the course of his career, was five times consul, and twice censor, was elected dictator immediately after the defeat of the Romans at Trasimenus. The peculiar line of tactics which he observed in the second Punic war obtained for him the surname by which he is best known in history. Hanging on the heights like a thundercloud, to which Hannibal himself compared him, and avoiding a direct engagement, he tantalized the enemy with his caution, harassed them by marches and countermarches, and cut off their stragglers and foragers, while at the same time his delay allowed Rome to assemble her forces in greater strength. This policy—which has become proverbial as "Fabian policy"—although the wisest in the circumstances, was neither appreciated in the camp nor at home; and shortly after, Marcus Minucius Rufus, master of the horse, was raised to an equal share in the dictatorship, a position, however, which he occupied but for a short time. During his fifth consulship, Fabius recovered Tarentum, which had long been one of Hannibal's important positions. He died in 203 B.C. C. Fabius, surnamed Pictor, executed upon the walls of the temple of Salus—dedicated by the dictator C. Junius Brutus Bubulus in 302—the earliest Roman paintings of which we have any record; and his grandson, Q. Fabius Pictor, was the first writer of a Roman history in prose.

FA'BLE (Lat. *fabula*) is a word of twofold signification. First, it is employed by some writers in a general sense to denote any fictitious narrative, as, for example, the incidents in an epic or dramatic poem. At one time also, when the myths of the Greeks and Romans were thought to be satisfactorily accounted for by regarding them as conscious inventions of the ancient poets and priests, it was customary to speak of them as *fables*, but this application of the term is now abandoned by scholars. See **MYTH**. According to the second and more frequent signification of the word, it denotes a special kind of literary composition, either prose or verse, in which a story of some kind is made the vehicle for conveying a universal truth. It differs from a parable in this respect, that while the latter never transcends in conception the bounds of the probable or the possible, the former always and of necessity does. The story of the "Good Samaritan" imagined by the Savior, is a parable; if it was not true, it might have been, for it contains nothing either improbable or impossible; but when Jotham went up to the top of Mt. Gerizim, and spoke to the men of Shechem about the trees going

forth to anoint a king over them, he made use of the F. proper. The peculiarity, therefore, of the *structure* of the F. consists in the transference to inanimate objects, or, more frequently, to the lower animals, of the qualities of rational beings. By the very novelty and utter impossibility of the representation, the interest of the hearer or reader is excited, and thus its symbolic meaning and moral became transparent to him, at least if the F. is well contrived. The ancient fabulists were simple, clear, and earnest in their representations. They seem to have sprung up in the east. Among the more celebrated are Bidpai (q.v.), or Pilpai, and the Arabian Lokman, who is said to have lived in the time of king David. Among the Greeks, the greatest name is that of Æsop (q.v.), whose fables, at a much later period—the precise time is not exactly known—were versified by a certain Babrius (q.v.). Among the Romans, Phædrus cleverly imitated Æsop, but with considerable modifications, thus giving a certain amount of independent value to his work. It is perhaps worth mentioning here, that the well-known F. of the *Town Mouse and Country Mouse*, told by Horace, is of purely Roman origin, and is probably the only one in existence of which that can be affirmed. Leaving the classical period, and before entering on the dark ages, we encounter the name of Aphythionius, who flourished in the early part of the 4th c., and who wrote indifferent fables in Greek prose; and still later, the name of Flavius Avianus, who composed forty-two, no better, in Latin elegiacs. During the dark ages, the F. in various forms appears to have been cultivated in the monasteries, although nothing meritorious has survived; but in the middle ages, it acquired fresh life and vigor. An edition of the fables current in Germany in the time of the Minnesingers has been published by Bodmer. The oldest known German fabulist is Stricker, who lived about the middle of the 13th c.; but the famous mediæval F. of *Reineke Fuchs*, or the History of Reynard the Fox (q.v.), stretches in some of its numerous primitive forms much further back. In later times, most nations have cultivated the F. with more or less success. We may mention among the English, Gay; among the Germans, Hagedorn and Gellert, and Lessing; among the Italians, Pignotti; among the Russians, Krylov; and above all, among the French, La Fontaine, whose fables are remarkable for their arch and lively humor, their delicate sarcasm, their sagacity, and felicity of expression. Now, however, the F. has gone entirely out of fashion.

FABLIAU, plur. **FABLIAUX** (from the Latin *fabulari*, *fabellare*, to speak or to tell), was the name given in the old French literature to a class of short metrical narratives, intended merely for recitation, and which had for their subject-matter the talk and news of the day in the middle ages. The narrator of such news was called a *fableur* (plur. *fabliers*), in opposition to the *chanteur*, or singer proper, who composed poems not only for recitation, but also for singing. Besides the fabliaux, the department of the *fableur* embraced the *Romans d'aventure* (in short unstrophed couplets), usually called *contes*, whence their author or reciter also bore the name of *conteur*; and the *dits*, or sayings, the special cultivator of which was termed a *diseur*. As the fabliaux were fundamentally distinguished from the more genuine forms of poetry by the every-day character of their subject-matter, so the mode of treatment which their authors adopted was also more anecdotal, epigrammatic, and witty—the wit being richly spiced with scandal. They appear to have maintained a sort of ironical and parodistic antagonism to the idealism of the epics of chivalry. In these fabliaux, the essential character of the French people manifested itself, and that opposition of the real to the ideal, of the understanding to the imagination, which, after the time of Francis I., began to characterize French literature generally. Thus they lashed not only the priesthood and the nobility in their actual degeneracy, but, from the very character of their satire, they engendered a contempt for the religious-chivalric spirit itself, and for all ecclesiastical and knightly notions and ceremonies. The oldest fabliaux are not of French origin; they are a fruit of the crusades, and were brought to France from the east, but they received a national coloring, and soon took root in the west. From them sprung the drama of France. One of the most fecund *fablière* was Rutebeuf, who flourished in the reigns of Louis IX. and Philippe III., whose works were published by Jubinal (2 vols., Paris, 1837). He was a true Parisian, and the prototype of Villon, La Fontaine, and Voltaire. The best collections of fabliaux and *contes* are those of Barbazan (3 vols., Paris, 1756), of Méon (2 vols., Paris, 1823), and of Jubinal (2 vols., Paris, 1839–43). See Bédier, *Les Fabliaux* (1893).

FABRE, FRANÇOIS XAVIER PASCAL, 1766–1837; b. France; a painter, pupil of David. One of Fabre's earliest productions, "Execution of the Children of Zedekiah by order of Nebuchadnezzar," secured for him the great prize of the academy. It was supposed that he was privately married to the duchess of Albany, who at her death made him her sole heir.

FABRETTI, RAFFAELE, a distinguished antiquary and archæologist, was b. at Urbino 1618, and was attracted at an early period to antiquarian studies by the great classical remains of Rome. Under Pope Alexander VII. he became papal treasurer, and subsequently was appointed chancellor to the papal embassy at Madrid. A residence of 13 years in Spain enabled him to explore all the antiquities of the kingdom, and to carry his studies to a point which rendered indispensable his return to Rome, the great parent fount of ancient learning. He was there made judge; and under Innocent XII., became keeper of the papal archives of the castle of St. Angelo, a post which afforded

the widest scope to his favorite pursuits. About this time he wrote his two important works: *De Aquis et Aqueductibus Veteris Romæ* (4 vols., 1680, reprinted with notes and additions in 1788), and *Syntagma de Columnâ Trajanâ* (Rome, 1683). His treatise entitled *Inscriptionum Antiquarum Explicatio* (1699) throws invaluable light on the discoveries made by himself in the catacombs; and his erudite investigations concerning the reliefs known as the Iliac tables, and the grand subterranean canals of the emperor Claudius, are equally full of interest to science. His rare collection of inscriptions, etc., is deposited in the ducal palace of Urbino. F. died in 1700.

FABRIANO, a city of Italy, in the province of Ancona (formerly part of the papal states), is situated at the eastern base of the Apennine range, 28 m. w. of Macerata. It has a cathedral, and several convents, but is chiefly worthy of mention on account of its great paper manufactures, which were established in 1564. The churches and private houses contain many specimens of the school of painting which flourished here. Pop. of commune about 18,200.

FABRIANO, GENTILE DA, an Italian painter, who flourished in the early part of the 15th century. He was born—it is not exactly known when—at Fabriano, and received his first instructions from his father, who appears to have been a man of superior culture, as he taught his son the elements of physics and mathematics. F.'s first teacher in art was, it is supposed, Allegrette de Nuzio. Subsequently, he went to Florence, and studied under Fiesole. Among his earliest works of note is a fresco of the Madonna in the cathedral of Orvieto. In 1423, he painted an "Adoration of the Kings" for the church of the Holy Trinity in Florence. This picture is one of the most admirable belonging to the school of Giotto. To the same period belongs a Madonna with saints (now in the Berlin museum). F. afterwards went to Venice, where he greatly increased his reputation by a picture of the bloody engagement between the fleet of the republic and that of the emperor Babarossa off the heights of Pirano. The Venetian senate was so delighted with the piece, that it conferred on the fortunate artist the dignity of a patrician, and a pension of a ducat *per diem* for life. Unhappily, this work has perished. Pope Martin V. now called F. to Rome, and employed him, along with Vittore Pisanello, in adorning the church of San Giovanni Laterano. As his share of the work, he painted various incidents in the life of John the Baptist, five prophets, and portraits of Pope Martin himself and 10 cardinals. He died, while engaged on this building, some time after 1450. F.'s pictures indicate a cheeful and joyous nature. He had quite a child-like love of splendor and rich ornamentation, but is never extravagant or excessive in his coloring.

FABRICÉ, GEORG FRIEDRICH ALFRED VON, b. 1818; commander of the German army which occupied France in 1871. He was for a long time in the service of Saxony; was secretary of war in 1866, and reorganized the Saxon army after the Prussian plan. He showed admirable administrative ability as well as military genius. He d. in 1891.

FABRICIUS, CAIUS (FABRICIUS) LUSCINUS, a Roman gen., elected consul 282 B.C., and again in 280. He was sent, after the defeat of the Romans by Pyrrhus, to treat for the ransom and exchange of prisoners. Pyrrhus endeavored to bribe him, but all offers were rejected. At a later period, he made peace between the Romans and Pyrrhus.

FABRICIUS, or FABRIZIO, GIROLAMO, commonly named from his birthplace F. AB ACQUAPENDENTE, a celebrated anatomist and surgeon, was b. in 1537, and d. in 1619. He was the son of humble parents who, notwithstanding their poverty, sent him to the university of Padua, where, in addition to the usual instruction in the classics, he studied anatomy and surgery under the celebrated Fallopius with such success, that on the death of the latter in 1562, F. was appointed to fill the vacant professorship. He continued to hold this office for nearly half a century, during which period his high character for eloquence, general erudition, and professional knowledge, attracted students from all parts of the civilized world to the university of Padua. Amongst these students was the Englishman Harvey (q.v.), who attended his prelections in 1598, and who, as will be seen in our notice of his life, derived from F.'s observations on the valves of the veins the first clue to his great discovery. He was a most laborious investigator of nature; and we find him comparing and contrasting the same organ in man, and in several of the lower animals, on a more methodical plan than had been attempted by any of his predecessors. In this way he treated of the eye, the larynx, the ear, the intestinal canal, the development of the fetus, and many other subjects. The improvements which his knowledge of anatomy enabled him to introduce into the practice of surgery were very great; and his *Opera Chirurgica*, which embraced every complaint curable by manual operation, was so highly valued, that it passed through seventeen editions. He was greatly esteemed by his fellow-citizens, for we find that the Venetian republic not only erected for him a spacious anatomical amphitheater, in which his name was inscribed, but at the same time conferred upon him an annual stipend of a thousand crowns, and created him a knight of the order of St. Mark. A few years before his death he retired with an ample fortune, from all professional duties, and died (some believe he was poisoned by his relatives) at the age of 82, in his villa on the banks of the Brenta, which still bears the name of the Montagnuola d'Acquapendente.

We have not space for a list of his numerous anatomical and surgical works. Upwards of a century after his death (in 1723), the celebrated anatomist Albinus collected and published a complete edition of all his anatomical and physiological works.

FABRICIUS, GEORG, 1516-71; b. Saxony; an archæologist. He made a minute examination of the antiquities of Rome, and wrote an elaborate work, so accurate in descriptions that many learned Germans believed it to be from the pen of some ancient writer. In 1553, he was appointed director of the college of Meissen, and held that office till his death.

FABRICIUS, JOANNES ALBERTUS, 1668-1736; b. Leipsic; a learned bibliographer. He stands pre-eminent among scholars for a series of literary catalogues entitled *Bibliotheca Latina*, *Bibliotheca Græca*, and *Bibliotheca Antiquaria*. He studied medicine, and afterwards theology; but most of his life was among books. A list of 128 of his works is given, of which, however, the greater part were merely edited.

FABRICIUS, JOH. CHRISTIAN, a Danish entomologist, b. at Tondern, Jan. 7, 1745, and d. at Kiel in 1808. He studied at Copenhagen, Edinburgh, Leyden, and Freyberg, and finally went to Upsala, to attend the classes of Linnæus. A warm friendship was cemented between master and pupil, and throughout his life F. was zealously employed in developing and applying the ideas and method of the great Swede. In 1775, F. was appointed to the chair of natural history at the university of Kiel, and from that time he devoted himself to the prosecution of his entomological studies, and to the fuller development of a system of classification of insects, based upon the structure of the mouth. Although his system has been found inapplicable to many families of insects, the observations on which it was based have tended materially to the extension of this branch of science. The *Systema Entomologia* (Copenh. 1775), in which F. expounded his views, constituted a new era in the history of entomology, while his *Genera Insectorum* (Kiel, 1776), *Mantissa Insectorum* (Copenh. 1787), and *Entomologia Systematica* (Copenh. 1792), opened hitherto unexplored fields of inquiry to the entomologist. F. was the author of several able treatises on the policy, statistics, and economy of Denmark, which were prepared by him in his capacity of counselor of state and prof. of rural and political economy at Kiel.

FABRONI, ANGELO, an excellent biographical writer, was b. at Marradi, in Tuscany, 7th Feb., 1732, educated at Faenza and Rome, and in 1773, was appointed tutor to the sons of Leopold, grand duke of Tuscany. He died 22d Sept., 1803. His *Vite Italarum Doctrina Excellentium qui Sæculo XVII. et XVIII. floruerunt* (20 vols., Pisa, 1778-1805), is one of the best Italian works of its kind, and contains quite a treasure of information; while his *Laurentii Medicei Vita* (2 vols., Pisa, 1784), and *Vita Magni Cosmi Medicei* (2 vols., Pisa, 1788-89), are reckoned model biographies.

FABULOUS ANIMALS. See **BESTIAIRES, GRIFFIN, UNICORN, BEAST FABLES.**

FABYAN, or FABIAN, ROBERT, b. London, near the middle of the 15th c.; an English chronicler, alderman, and sheriff of London. His *Chronicle* extends from the time when "Brute entered first the ile of Albion" to the year 1485. The chief value of the work is its details of city government and ceremonial.

FAÇADE (Fr.), the exterior front or face of a building. This term, although frequently restricted to classic architecture, may be applied to the front elevation of a building in any style. It is, however, generally used with reference to buildings of some magnitude and pretensions; thus, we speak of the *front* of a house, and the F. of a palace. The back elevation of an important building is called the rear F., in the same way as in England the back of a house is called the "*back front*."

An edifice may have any number of façades when it shows a face or front in each direction. An elevation of the side of a building is called the *lateral façade*. The sides of a court or cortile are also called façades, and are distinguished as n., s., etc., façades.

FACCIOLA'TI, JACOPO, an Italian philologist and critic, was b. at Torreglia, not far from Padua, in 1682. He was educated in the religious seminary at Padua, where he became successively prof. of theology, prof. of philosophy, and superintendent-general of the classes, or rector of the institution. F. directed his attention chiefly to the revival of the study of ancient literature, and with this object, brought out a new edition of the *Lexicon Septem Linguarum*, called, from its original author, the monk Ambrosius of Calepio, the *Calepine Lexicon*. He was assisted in this work by his pupil, Forcellini, to whom is mainly owing the conception of a totally new Latin dictionary; an arduous undertaking, which F. continued till his death in 1769, and which was afterwards completed by Forcellini in 1771. F. and Forcellini, assisted by several others, likewise published a new edition of Nizoli's *Thesaurus Ciceronianus*. F.'s Latin epistles and orations are remarkable for the Ciceronian elegance of their style, and his notices on several philosophical writings of Cicero for their solidity, clearness, and taste.

FACET, a term employed to denote the plane surfaces of crystals, or those artificially cut upon precious stones.

FACIAL ANGLE. See **ANGLE.**

FACIAL NERVE, the seventh cranial nerve in Sömmering's classification, originating in the medulla oblongata, passing through the temporal bone, and issuing from the skull through the stylomastoid foramen. It then branches over the superficial portions of the face, and acts as the muscle of expression. It was formerly classed as a portion of the seventh nerve, the *portio dura*, the other portion being the *portio mollis*, or auditory nerve; according to Sömmering, the 8th pair.

FACIAL NEURALGIA, paroxysmal pains in the head and face, caused by a morbid state of the nervous centre, which may be the result of lack of nutrition, of blood-poisoning, or of hereditary predisposition. It may also be caused by irritation from bad teeth, and by inflammation of the facial nerve.

FACIAL PARALYSIS, a paralysis of the facial nerve on which depends the power to move the muscles of the face. One or both sides of the face may be thus affected, and the attack is quite certain to be attended with a partial or entire loss of the power of articulation.

FAC-SIMILE (Lat. *fac simile*, make like, or an abbreviation of *factum simile*, made like), an exact copy, especially of handwriting, or of printed works, engravings, inscriptions, manuscripts, and the like.

FACTOR, in mathematics. The numbers 6 and 4, multiplied together, *make* 24; hence 6 and 4 are called *factors* of the product 24. Most numbers are products of two or more factors; thus $10=2\times 5$; $12=3\times 4$, or 2×6 , or $2\times 2\times 3$. Every product can be divided by any of its factors without remainder; a factor, therefore, is often called a *divisor*, or measure. 2, 3, 4, 6, 8, 12, are all factors or divisors of 24. Numbers that have no factor or divisor above unity, such as 2, 3, 5, 7, 11, . . . 23, etc., are called *prime* numbers. See NUMBERS, THEORY OF.

FACTOR, a man employed to sell the goods of another; in the United States usually called a commission merchant, because he has his compensation in a commission or percentage upon the goods he sells. He differs from a broker in that he has actual possession of the goods of his principal, and is empowered to deliver them to the purchaser as if they were his own. He generally buys and sells in his own name, so that those dealing with him may not know whether he is owner or factor. Under some limitations for self-protection, he is bound by the instructions of his principal and responsible for damages arising from a violation thereof. In the absence of special instructions, he is bound to use all reasonable care in the management of the property committed to his charge, to employ the usual methods of business, and to have due regard to the welfare and interests of his employer. Otherwise he is not entitled to his commissions; and for injurious negligence or want of proper caution may even be sued by his principal. He cannot delegate his authority without express permission of his principal, except in conformity to general usage or by stress of peculiar circumstances. He cannot sell goods at a sacrifice for the purpose of obtaining his commission and advances. It is generally held in the United States that a factor, who has made advances upon goods, acquires such an interest in them that the principal cannot take them out of his possession by a revocation of his authority. The factor can sell enough of them to reimburse himself, the principal having power over the remainder. The rule in England, however, is different. In many American states, a factor is deemed to be the true owner in the sense that sales made by him to purchasers acting in good faith are valid; even where the sale is made in violation of special instructions title is in certain cases conferred. Sometimes in consideration of an increased commission, he guarantees to the principal payment for the goods which have been sold. In the case he acts under a *del credere* or guaranty commission, and is in general subject to most of the obligations of a surety. A factor whose principal resides in a foreign country stands to purchasers, in most respects, in the relation of an absolute owner, and is therefore under a much greater responsibility. If a factor commits any wrongful act in a sale the principal has a right to recover his goods whenever he can trace them, unless they are in the possession of one who purchased them in good faith. See AGENT; BROKER; COMMISSION DEL CREDERE; COMMISSION MERCHANT.

FACTORIES are establishments where large numbers of persons co-operate in the production of some article of consumption, the principle of the division of labor being in all cases applied. The factory system originated in the manufacture of textile fabrics, to which the remarkable inventions that distinguished the end of the eighteenth century gave such an impulse, by the introduction of machinery and improved methods. By the domestic or home industry that prevailed until superseded by the factories, each weaver performed all the processes of preparing his web or warp within his own dwelling, depending upon the spinner for his supply of yarn, while the latter, not having the means of spinning more than a single thread at a time, was often slow in filling the demand, thereby forcing the weaver to suspend the operations of his loom, and causing a great uncertainty as to the duration of his labor and the amount of his earnings. When, under the stimulus of this need, the spinning machine of Wyatt and Arkwright, the spinning-jenny of Hargreaves, and the improved contrivances of Crompton were successively introduced, one of the obstructions to the development of the cotton industry was removed, and in the small mill, with its few operatives, where this newly invented machinery was employed, we trace the origin of the modern factory system. Upon the completion of the canal system by Brindley, in 1807, and the application of the steam

engine to manufactures, on the breaking out of the American war, the factory movement became more noticeable, and when by the close of the war and the downfall of the slave trade, merchants were forced to seek new channels for the employment of their capital the new system had made extraordinary progress. Its establishment in their country belongs to a somewhat later date. Several laws were passed in England prohibiting the exportation of machinery used in manufactures or models thereof, and in spite of several attempts on the part of the Americans to introduce the English methods, the secrets were tolerably well kept, until the system of water-frame spinning was introduced, and a factory built by Samuel Slater at Pawtucket, Rhode Island, in 1790. Since that time the factory system in the United States, promoted by Whitney's invention of the cotton-gin, in 1792, and by Towell's introduction of the power-loom, with other improvements in his factory at Waltham, in 1814, has maintained an uninterrupted progress and, notwithstanding its later adoption, has surpassed the English system both in the rapidity of its extension and the variety of the industries to which it has been applied. The advantages of its employment having been seen in the progress of the textile manufactures, it was applied to the manufacture of boots and shoes, of watches, musical instruments, agricultural implements, clothing, metallic goods generally, fire-arms, carriages and wagons, woolen goods, and even in the killing of pigs, until it is now estimated that fully four-fifths of the people employed in the mechanical industries of this country are working under the factory system.

The chief advantages possessed by this system over the domestic industry are the following: Loss of time is avoided in passing from one operation to another, a loss which is the greater, the greater the difference in the nature of the operation. The workman, confined to one thing, in itself usually simple, not only learns it sooner, but attains a quickness and skill that one distracted with a variety of operations can never attain; besides, the constant occupation with one kind of work leads the workman to light upon improvements in tools and machines so as to increase their rapidity of execution and their precision. As only few of the processes are very difficult, it is possible to turn to some account less skillful workmen, and even children, and assign to each person that kind of work at which he is more effective. All parts of the work, too, that are quite uniform in the case of each article can generally be done by machinery. Lastly, in factories there is more opportunity of turning to advantage all kinds of refuse. As a consequence of these advantages the cost of production is less under the factory system than when the house industry prevailed; and more than that, the articles themselves, when of a nature adapted to this mode of production are better and of a uniformity otherwise unattainable.

While the rise and extension of the factory system, when looked at from the standpoint of material economics, must be pronounced a decided improvement, a less encouraging view of its political and social effect is presented by the contemplation of some of its alleged disadvantages. The greater the capital and training necessary for carrying on an extensive establishment, the less prospect the workman has of ever raising himself to independence, and in the absence of a reasonable hope of advancement the incentive of ambition is wanting and a powerful moral support removed. Factory-workers are especially disposed to enter heedlessly into marriage, as they require to make no provision for a workshop, tools, and other outlay; while they have the prospect of the wife, and soon, of the children, as contributors to the support of the family. The factory system is said to necessitate the employment of women and children to an injurious extent, and its consequent tendency is to weaken the family ties and domestic habits. Other evils urged against the system are the injury to health, the increase of intemperance, poverty, and crime, and the tendency toward intellectual degeneracy. While these charges must, to a certain extent, be admitted, the statistics of mortality and of vice and crime under the factory system show them in many instances to be unfounded, and where abuses have been found to exist they appear to be the fault of the employer, or of the operatives themselves rather than the result of any inherent defect in the system. Moreover, it cannot be allowed that these evils are irremediable; legislation and public opinion can do much; nor must it be forgotten that the evil is not peculiar to factory labor, but is a feature of the whole recent industrial economics. See MANUFACTURES; and MACHINERY, POLITICAL ECONOMY OF.

FACTORY ACTS. As the origin and early growth of the modern factory system must be ascribed to England, so we must turn to that country for the first acquaintance with the evils that accompanied its development, and for the earliest attempts to remedy these evils by legislative means. When the new industrial methods had begun to acquire a firm footing, one of the few laws dealing expressly with the condition of the laborer was the Apprentices Act of 1562, prohibiting the employment of workmen as journeymen in certain trades unless an apprenticeship of seven years had been previously served, permitting the apprenticeship of pauper children, and regulating the hours of work. Before the use of steam as a motive power in the manufacture of textile fabrics, the choice of a location for the factory was limited to places where the water supply was sufficient to drive the machinery, and since the consideration of abundant labor alone could not guide his selection of site, the factory owner was often hard pressed for the requisite number of employes when his demand exceeded the supply of available workmen in the vicinity. To meet this demand there arose the practice on the part of

the parish authorities of ridding their parishes of an expensive charge by apprenticing the pauper children to the mill-owners, who, on becoming masters of these unfortunates, acquired, in accordance with the existing system of apprenticeship, an almost unrestricted power over them—a power which they not unfrequently abused to the shameful disregard of justice and humanity. While the condition of children who were not apprenticed was almost as deplorable, and while, in fact, the great majority of the operatives presented a pitiable spectacle of misery, degradation, and ignorance, the question of remedial legislation, first agitated in parliament by sir Robert Peel in 1802, related only to apprentices, who, having been the objects of special regulation since the act of 1562, afforded for legislative interference the precedent without which the conservative spirit of the time was reluctant to proceed. Notwithstanding the insufficiency of its provisions, the act of 1802, entitled “An act for the preservation of the health and morals of apprentices and others employed in cotton and other mills, and in cotton and other factories,” marks a very important advance; and as the starting-point of factory legislation is the first example of the assertion and enforcement of the claim on the part of the state to interfere in the interests of humanity between employer and employed, and shows the earliest embodiment of the policy at present so extensively pursued of seeking to better the condition of the laborer by enlarging and enforcing his rights. By this law employers were required to clothe their apprentices, the hours of labor were limited to twelve, night work was prohibited with some unimportant exceptions, and useful sanitary regulations were provided. The apprentice was to receive daily teaching during the first four years of his time, school attendance being reckoned as working time, and religious instruction on Sundays was to be supplied. But before the good effect of these salutary provisions could be deeply felt, the introduction of steam had rendered it possible to set up factories near populous towns, where there was abundance of free and cheap labor, to which none of these protective provisions applied, and the glaring abuses of the system continued to prevail. At this juncture there arose among the employers a movement to procure the repeal of the older act, which, being once removed, they saw that the restrictions of the later act—that of 1802—would become inoperative, while the supporters of the latter measure foresaw that when the necessity for further legislation arose to take its place the way would be cleared for enactments of a more sweeping character that would apply to all factory operatives. The efforts in behalf of repeal were successful in 1814, and in the period that followed the friends of factory reform exerted themselves most strenuously in its behalf, urging in support of their views the wretched condition of employés and the bad effects upon the future of the country of the ill-health, low standard of living, and consequent degeneracy resulting from the existing abuses. The arguments advanced by their opponents, heard often at the present day whenever questions of legislative interference with labor arise, sounded the danger of tampering with the “freedom of labor,” clung to the principle of *laissez faire*, and maintained the right of the parent to send his child to work under such conditions as he pleased. Nor was the opposition due to motives of self-interest merely. Many feared that reducing the hours of work and limiting the employment of children would, in the close competition that existed with employers in other countries not subject to such restrictions, check the development of industry by rendering investment unprofitable, lead to the division of capital, and thereby react upon the laborer himself, forcing him out of employment. In 1816 a commission was appointed by parliament to inquire into the condition of the laborer, and since that time many similar inquiries have been instituted, and the principle that the interest of factory employés are a matter for governmental concern has been more and more firmly established. In the act of 1819, which applied only to cotton-mills, the right of the legislature to limit the age at which children may be employed found expression. None are to be employed under the age of nine, nor for more than twelve hours a day between the ages of nine and sixteen. In 1847 the ten-hour law was passed, and since that time the provisions affecting factories were rapidly extended to other industries. In recent years the hours have been reduced to nine and a half. The beneficial effects of the legislative regulations affecting the education of factory children are readily discernible and cannot be too highly commended, as a comparison with the children of agricultural laborers, who receive no such protection, will plainly show, and the improvement in their physical condition has been most noticeable. The success of factory legislation in England has been largely due to the zeal, efficiency, and impartiality of the inspectors appointed by the government to see that the laws are properly executed, and the manufacturers unanimously acknowledge that it is owing to them that an entire application of the law has been possible without seriously imperilling the interests of individuals. The scope of legislative interference has greatly widened; and while the beginning of the century saw the principle of individualism in full force as to the laborer, and the freedom of labor rigidly maintained, but trade hemmed in with countless restrictions, now the conditions appear to be exactly reversed: the laborer is guarded in his rights by numerous protective statutes, and trade has become in large measure free.

As the growth of the factory system in the United States was not accompanied by such abuses as existed in England; the need of state regulation was not so strongly felt as in the latter country, but in the progress and extension of the new movement there were not wanting laws to enforce the humane treatment of employés, and few states

where manufactures predominate are without legislation prescribing the hours of labor, restricting the employment of children, and containing provisions for their education, and securing the safety of workshops.

Employers' liability.—Nothing affords a better illustration of the change effected in the public sentiments with regard to the legitimate province of legislation in the interest of the laborer than the present tendency to increase the liability of the employer for accidents to his employes. The common-law doctrine as first expressed in England, and afterwards endorsed in this country, was that the employer was not responsible for an accident to his employé caused by the negligence of a co-laborer, unless it could be proved that the latter was an unfit agent, whose selection had been made with too little care. The only other case in which the employer was liable was when he had himself interfered in the act which caused the injury. Where legislative restrictions do not exist this continues to be the rule in the United States in all cases where the laborer, by special contract with his employer, has not increased the latter's liability; but the burden of such a contract rests upon the laborer, the manufacturer rarely if ever taking the initial steps. In Iowa, however, it is provided by statute law that "every railroad company shall be liable for all damages sustained by any person, including employes of the company, in consequence of any neglect of its agent, or by any mismanagement of its engineers or other employes of the company." This law relates only to railroads, and in all other cases the common law applies. The tendency in recent times to widen the employer's responsibility for accidents to his workmen promises to afford a grave question for consideration, and it is probable that before long more extensive provisions to this end will appear upon our statute books. This has been the case in England, where by the law of 1880 this liability is extended to a number of cases, such as injuries received by reason of defect in the machinery, etc., used by the company, or by reason of the negligence of a fellow employé with powers of superintendence, or of an act of any person in the employer's service done in accordance with the rules or by-laws of the employer. See MASTER AND SERVANT.

To appreciate the nature and extent of modern factory legislation, an examination of some of the provisions of existing laws will be necessary. The most advanced and elaborate measures dealing with the subject are to be found in England, and of these the law of 1878, known as the "British factory and workshop act," consolidating all the factory acts since Peel's act of 1802, deserves especial attention. The following are some of the main provisions affecting employment in textile factories: The inspectors are authorized to investigate the sanitary condition of factories in company with medical officers of health, and to correct abuses if found to exist. Machinery in motion and dangerous places are to be fenced in. Children must not be set to clean machinery in motion, nor is work to be done between the fixed and traversing parts of a machine. The period of employment for young persons and women is from 6 A.M. to 6 P.M., or from 7 A.M. to 7 P.M. Saturdays are half holidays, with an allowance of at least a half hour for meals. On other days all children, young persons and women must have two hours for meals, and are not to be employed for more than four and a half hours without an interval of a half hour. Their employment on Christmas and Good Friday is forbidden, but instead of the latter the next public holiday may be observed. There are eight half holidays, or their equivalent whole holidays, half of which must be given between March 15 and Oct. 1. Children under 10 years of age are not to be employed at all, and older children can be employed only for half the day (either mornings or afternoons) or on alternate days. During the unoccupied portion of the day the parents are required to send them to an efficient and recognized school, attendance at which, except on Saturdays and holidays, must be certified by the schoolmaster to the employer, who is obliged to keep such certificate for two months and produce the same on the demand of the inspector. The schoolmaster may apply to the employer for the payment of tuition in a sum not exceeding 3*d* a week, to be deducted from the child's wages. When a child of 13 has obtained a certificate of proficiency, either of having passed the prescribed standard, or attended school for the required time, he attains the status of a young person. The inspector appoints a certifying surgeon, whose certificate of fitness for employment, supported by the certificate of birth, is necessary in the case of persons under sixteen. A notice of hours of work and of meals, an abstract of the act, and the names of inspector and certifying surgeons are to be hung up in the factory. A register of young persons under sixteen is to be kept, with details as prescribed by the secretary of state.

In France, boys under twelve and girls under sixteen years of age may not be employed, except in certain specified kinds of labor, in which it is permissible to employ boys between the ages of ten and twelve, but not for a longer time than six hours a day, and this period must be divided by an interval of rest. Night work is forbidden for boys under sixteen and girls under twenty-one, except under special conditions. Boys under sixteen and women are not to be employed underground, but here again certain exceptions exist, in accordance with which even boys under twelve may be employed below the surface, but for not longer than eight hours out of the twenty-four, and with an interval of at least an hour's rest.

The law of Germany prohibits the employment of children under twelve, and children under fourteen may not be employed longer than six hours daily. Children obliged

to attend the national schools are employed only on condition that they attend school for at least three hours each day. Young persons between the ages of fourteen and sixteen may not be employed in factories for more than ten hours a day. Special official inspectors are appointed by the governments to see to the proper observance of factory regulation, and are authorized to enter factories at any time during the hours of labor, whether in the day-time or at night, and to give notice of all violations of the law, but are required to keep secret any knowledge which they may officially obtain as to the business or the working of the factories under their supervision. Their annual reports or extracts from them must be laid before the *Bundesrath* and the *Reichstag*.

In the United States labor legislation is always a matter for the separate states, but the limits of the present article admit only a brief outline of the regulations in force in two or three of our principal manufacturing states. The law of Connecticut provides that no child under fourteen years of age who has resided in the United States nine months can be employed at labor without a certificate from his parent or guardian to his employer that he has attended school for twelve weeks, or sixty full school days of the year next preceding the month in which he is employed, and that six weeks' attendance has been consecutive. The employer is required to keep this certificate while the child is employed, and show it during business hours to a school visitor or secretary or agent of the state board of education. Persons or corporations requiring from their employes, under penalty of a forfeiture of a part of their wages, a notice of their intention to leave such employment are liable to the payment of a like forfeiture if their employes are discharged without special notice, except for incapacity or misconduct, or in case of a general suspension of labor by the employer. Minors under fifteen years of age may not be employed more than ten hours a day, or fifty-eight hours a week. Eight hours' work in any day is to be considered a day's labor, unless otherwise agreed. School visitors of towns must examine, once or oftener every year, the condition of children employed in factories to see the law relating to such employment is complied with, and report violations thereof to the grand jurors. Other provisions relate to the safety of buildings, requiring means of egress in case of fire, etc.

Massachusetts.—Inspectors of factories and public buildings designated from the district police by the governor must enforce the provisions of the law relating to the inspection of buildings, and the employment of young persons and women, and in the exercise of their authority are empowered to enter all manufacturing and mercantile establishments and make the necessary inquiries as to the methods employed and measures of protection adopted. Persons or corporations employing females in manufacturing, mechanical, or mercantile establishments must provide suitable seats and permit their use by such females when not necessarily engaged in their active duties. The employment in such establishments of minors under 18, or of women for more than ten hours a day, or sixty hours a week, is forbidden, except when necessary to make repairs in the machinery to insure its ordinary running, or when the hours are differently apportioned for the sole purpose of making one day's work shorter; and employers must post in conspicuous places where such persons are employed a notice stating the number of hours required. No child under twelve shall be employed in these establishments at any time during the days in which the public schools are in session; nor shall any child under fourteen be so employed, except during the vacations of the public schools, unless during the year preceding such employment he has for twenty weeks attended some public or private day school; and no child shall be employed who does not present a certificate of such attendance to his employer, who is required to keep it on file together with a certificate of the child's age and place of birth. Children under fourteen who cannot read and write are not to be employed while public schools are in session. Very extensive regulations govern the arrangement of appliances facilitating escape from buildings in case of fire, the safety of elevators, the covering of hatchways, etc., and violation subjects the offender to a severe penalty.

In *New York* it is provided that eight hours shall be a day's work for mechanics, workingmen, and laborers, except in farm or domestic labor, but overwork for extra pay is permitted. Many of the other features of New York legislation closely resemble the provisions of the Massachusetts law.

Legislation on this topic is always and necessarily a matter for the separate states. The legislatures in the various states have dealt with it more or less fully, as the population of the state comprised a larger or smaller proportion of factory operatives. The principal law found in them all is that which imposes a limitation upon the age of children to be so employed, and regulates the number of hours of labor. In some states it is required that children in factories, if under a certain age, shall not only be excused from work during certain periods, but shall be compelled to attend school during this enforced absence from work. It cannot be doubted that the effect of these laws is good, but they are often rendered difficult of enforcement because both operators and manufacturers seek to evade them.

FACULÆ (Lat. *facula*, a torch), in astronomy, are spots, brighter than the rest of the surface, which are sometimes seen on the sun's disk. See **SUN**.

FACULTY. See **UNIVERSITY**.

FACULTY, a name applied to certain aptitudes or powers of the mind, especially

those of the intellect. Reid considered that the characteristic of a faculty was its *primitive* character, as opposed to the acquired powers, or habits. Sir W. Hamilton remarks on this distinction as follows: "Powers are *active and passive, natural and acquired*. Powers natural and active are called *faculties*. Powers natural and passive, *capacities or receptivities*. Powers acquired are habits, and habit is used both in an active and passive sense."—Reid, p. 221. Hence, in discussing the intellect, whatever are considered its primary or fundamental functions, are its faculties. Perception, memory, reasoning, imagination, are the leading intellectual faculties, according to the older metaphysicians, who followed the popular classification. These would not now be considered as giving the ultimate analysis of the intellect. Conscience, or the moral sense, has sometimes been called the *moral* faculty. See INTELLECT.

FACULTY OF ADVOCATES. See ADVOCATE.

FÆCES, or SOLID EXCREMENTS, are the matters which an animal ejects from the lower end of the intestinal canal, and in greater part, consist of those portions of food which, on passing through the alimentary canal, have been rejected as comparatively worthless in the office of nutrition. In the higher animals, the F. generally contain about three fourths of their weight of water, the remaining one fourth consisting, in greater part, of organic remains; in the case of the ox, sheep, and other herbivorous animals, of undigested woody fiber. In the human subject, the quantity of F. yielded daily by an average healthy man is 5 to 6 ozs.; the peculiar brown color is due to the presence of decomposing biliary matter, and the odor to partially changed nitrogenous substances resembling casein. The following table gives the composition of human and ox fæces:

| HUMAN. | | Ox. | |
|----------------------------------|------|----------------------|-------|
| Water..... | 73.3 | Water..... | 70.00 |
| Organic remains..... | 7.0 | Woody fiber | 22.50 |
| Biliary and nitrogenous matter.. | 14.9 | Wax..... | 0.76 |
| Albumen..... | 0.9 | Sugar..... | 3.00 |
| Extract..... | 2.7 | Albumen..... | 2.00 |
| Salts..... | 1.2 | Resin and salts..... | 1.74 |

For use as manure, these F. are of little value as compared with guano, dissolved bones, or superphosphates, and, indeed, the principal effete matters of importance to the agriculturist are resident in the urine or liquid excrement of the higher animals. In the case, however, of birds and reptiles, the urine and F. are voided together more or less moist, and hence the richness of such excrementitious matter, and its high agricultural value. See GUANO. The following table gives the composition of the F. of the boa constrictor:

| | |
|--------------------------------|-------|
| Uric acid..... | 90.16 |
| Ammonia..... | 1.70 |
| Potash | 3.45 |
| Sulphate of potash.... | 0.95 |
| Phosphate of lime, etc..... | 0.80 |
| Mucus and coloring matter..... | 2.94 |
| <hr/> | |
| 100.00 | |

FAED, JOHN, a popular Scottish painter, was b. in 1820 at Burley Mill, in the stewartry of Kirkcudbright, where his father was an engineer and millwright. His love of art was manifested at an early period, and when hardly entered on his teens, he was in the habit of making tours through the villages of Galloway, painting miniatures. In 1841, he came to Edinburgh, where his talents ultimately won him a high reputation. The first picture of F.'s that obtained great popularity was "The Cruel Sisters" (1851). Since then, F. has executed, among other works, "Shakespeare and his Contemporaries," "The Cotter's Saturday Night," and "The Soldier's Return;" and, since coming to London in 1864, "The Wappenschaw," "The Old Style," "Tam o' Shanter," "Haddon Hall of Old," "The Stirrup Cup," "John Anderson my Jo," "The Gamekeeper's Daughter," and "The Hiring Fair."

FAED, THOMAS, brother of the preceding, was b. at Burley Mill in 1826, and has also followed the career of an artist. One of his earliest efforts was a drawing (in water-colors) from the *Old English Baron*. In 1849, he became an associate of the royal Scottish academy, and shortly after executed a very attractive work, entitled "Scott and his Friends at Abbotsford." In 1852, he removed to London, where his "Mitherless Bairn," exhibited in 1855, was declared by the critics to be "the picture of the season." Of his subsequent works, we need only mention "Home and the Homeless," "The First Break in the Family," "Sunday in the Backwoods," "From Dawn to Sunset," "Baith Faither and Mither," and "The Last o' the Clan." F. was made A.R.A. in 1859, R.A. in 1864, and elected an honorary member of the Vienna royal academy in 1875.

FAENZA, a t. of Italy, 20 m. s.w. of Ravenna, is on the left bank of the Lamone, in a beautiful plain. It is built in the form of a square divided by four great streets,

which meet in the center. Among the chief buildings are an imposing cathedral, a fine market-place surrounded with arcades and adorned with a fountain, and numerous palaces and ecclesiastical edifices. Its manufacture of glazed and colored earthenware vessels, in Italy called "majolica," and in France "faïence" (q.v.), has declined in importance, and its chief industry now is the making of silk, linen, and paper. Pop. '81, 13,998.

F., the ancient *Faventia*, was at one period a town of the Boii, was afterwards a *municipium* under the Romans, and was annexed to the states of the church in the 15th c. by pope Alexander VI., in which condition it remained till 1860, when, with the Emilian provinces, it was annexed to the kingdom of Italy under Victor Emmanuel.

FESULÆ. See FIESOLE.

FAGGING is the name given to a usage peculiar to the great public schools of England, the nature of which will be presently described. The origin of the practice cannot be traced. No school statutes refer to it, no school traditions speak of a time when it was not. The statutes of Eton college rather indicate precaution against it, for they ordain that there be thirteen poor youths in the establishment to work for the college; but in Edward IV.'s time the college was much impoverished by royal depredations—the fellowships were cut down from ten to seven, and these *pauperes juniores* abolished. However, be the origin what it may, the institution, as we have said, exists, and in very nearly the same form, in all the public schools—that is to say, Eton, Harrow, Westminster, Winchester, and Rugby. Its main features are in every case much as follows: In each school there are two limits: the upper limit extending to the bottom of the first one or two forms (the public school designation of classes), below which a boy may not fag; and the lower limit, comprising the last four or five of the lowest forms, above which a boy may not be fagged. The boys between these limits, as also those who, although comprised within the lower limit, have been more than a certain time in the school, are devoid alike of rights and duties in connection with this practice. The services of a fag are of two kinds—the one comprising his duties to a special master, to whom he has been assigned; the other consisting of those due to the whole of the upper boys. The former comprise such tasks as preparing his master's breakfast, stoking his master's fire, carrying his master's messages, and smuggling into the house little forbidden delicacies for his master's consumption, and in this instance, if detected, bearing his master's punishment. Those services which a lower boy owes to the whole of the upper boys, consist of attendance at the games. In the cricket season, the fags perform the functions of a net, and stand behind the wickets to stop the balls while their seniors are practicing; and at all seasons they are liable to the drearier task of waiting attendance on the racket-players, and retrieving the balls which have been "skied" out of the court. All cases of difficulty arising out of fagging are within the jurisdiction of the head-boy in the house, or the head of the school, and are settled by reference to him. Such are the main features of F. at the present day—the idea pervading the institution being, that no boy should be liable to the performance of any duties really menial, but only such as, in the absence of the practice, would naturally be performed by each boy for himself. Many of the abuses of this practice, which have from time to time been discovered and suppressed, afford whimsical illustrations of the peccant ingenuity of boy-nature. In one school, a senior boy once had a study, but was not studious; he might have let it out to a younger boy in want of a crib to read in at a rent of some five or ten shillings a term, but his mind soared beyond such paltry dealings; he conceived vaster and grander ideas of the management of his property: he set up a tap. He smuggled into his room a nine-gallon cask, called a "governor." There was a rapid succession of governors, and a brisk demand for beer; so he appointed his fag, a fine stout lad, as deputy-tapster to receive the coppers. The deputy grew attached to both his governors, and flourished long and happily in the faithful discharge of his duties. Another instance consisted of an equally whimsical and widely different exercise of power. A sixth-form boy, of high-church principles, made his fags, two very nice well-conditioned young scholars, get up early and come to his room every morning before school for prayers.

So prominent a feature in the constitution of English public schools as the institution of F., has, of course, received much criticism from educational reformers. The well-known author of the letters from Paterfamilias to the *Cornhill Magazine*, himself an Etonian, and one of those rare instances of a public-school man dissatisfied with the recollections of his school-life, speaks of the practice with the greatest bitterness. "Fagging," says he, "now happily almost obsolete, was also based upon the breeches-pocket question. I used often to doubt, when called off from my studies, whilst a lower boy at Harchester, to mend my master's fire, to prepare his meals, or to brush his clothes, whether a system which permitted and upheld such practices could really be beneficial to him or to me: but I never had any doubt that it was very beneficial to our tutor, inasmuch as it spared him the wages of some two or three servants, whose menial work was performed by the lower boys. Of course, the ingenuity of our masters discovered plenty of excellent arguments in support of practices so convenient to themselves; our parents used to be told that carrying coals for the upper boys, and toasting their muffins, made us helpful and docile, and took the nonsense out of bumptious lads; but such arguments would have applied just as aptly towards establishing the propriety

of setting young noblemen and gentlemen to assist the scullion, or to sort out the dirty linen for the wash." These are certainly sharp words, but doubtless many persons may be found to sympathize with a great deal of the censure contained in them. They will tell us that much vigilance is necessary to prevent the abuse of the power of exacting casual service on the part of the senior boys, and that the rules of F., such as they are, give no adequate security against serious vexation and waste of a small boy's time. They say that the favorite apology, on the ground of its taking the conceit out of those who have been spoiled at home, is fallacious; that football and parsing are sufficient curatives of this evil tone of mind; and that if the necessity to render service to a senior takes the conceit out, the subsequent privilege of the early exercise of power only too rapidly pours it in again. They deny, also, the validity of one very favorite assertion of the upholders of the system, that the relation between master and fag often, and indeed generally, gives rise to very pleasant intimacies between the upper and lower boys, and intimacies very beneficial to the latter. On the contrary, they maintain that no case of attachment between master and fag can be pointed to which would not have existed under any circumstances, and that this relation may often be found to have marred what would otherwise have been a very friendly recollection. The advocates of the system tell us, on the other hand, that the attendant evils are greatly exaggerated, and in some cases purely fictitious, while it is in many respects of very great, if not essential, service to the existence of a public school. They deny that it has been originated and upheld by the tutors from purely commercial considerations, as asserted by Paterfamilias; for, as has been already said, no really menial services are exacted of any boy, but only such as each boy might reasonably be expected to perform for himself, inasmuch as, in point of fact, many men at the university—not choosing or not being able to afford a gyp—do really prepare their own breakfast, stoke their own fires, and go on their own errands. That while abuses do occasionally occur, everything is against the probability of their frequency or extent, as the utmost facility exists on the part of the juniors for bringing their grievances before the proper authorities, and obtaining speedy redress. They say that, as a fact, the services of a fag are so light that he does not care or think about them, and they appeal in support of this statement to the tone in which the boys themselves are in the habit of referring to the subject. See the *Etonian*, a periodical published by some Eton boys 30 or 40 years ago; and the *Triumvirate*, a similar and more modern periodical from Harrow school. But the principal argument in the defense of the system must always rest, its supporters tell us, upon the security afforded by it against bullying. In public schools, where the ages of the boys vary from 10 to 20, a much greater liberty is given to the boys, and much greater confidence is reposed in them than in private schools—the idea being, that their characters can only be truly formed by as unrestricted intercourse as possible among themselves, not hampered by the constant presence of a superior. This constant presence of a master is, therefore, replaced by the traditions and constitution of the school, in which each boy has his assigned position, and his definite rights and duties; a constitution, therefore, which each boy feels a personal interest in upholding. Such a society necessarily requires a provision for the relation between older and younger boys, between the weaker and the stronger; for, in the absence of this, the ordinary aspects of barbarism would be presented, and brute force be alone predominant. Such a provision, acceptable and intelligible to the boys, and reasonable in itself, is believed to be found in the F. system. By this system, it is affirmed, provision is made alike for the claims of age and intellect, inasmuch as it is scarcely possible that any very stupid boy should fag, while no very old boy ever can be fagged.

These are the chief features of the F. system at public schools, and the principal arguments for it and against it. See PENNALISM.

FAGNA'NI, JOSEPH, 1819-73; an American artist; b. Italy. He studied in Vienna and Paris, and came to the United States with sir Henry Bulwer in 1849, and, in 1851, married an American wife. He returned to Europe and made portraits of a large number of public characters, among them Victor Emanuel, Abdul Aziz, Garibaldi, the empress Eugénie, and Ali Pasha. On returning to New York, he painted a series called "The Nine Muses," portraits of the most beautiful women of New York.

FAGUS. See BEECH.

FAHLCRANTZ, KARL JOHAN, 1774-1861; b. Sweden; a self-taught painter, whose landscapes were pronounced the best produced in his country.

FAHR ENHEIT, GABRIEL DANIEL, the improver of the thermometer, was b. at Dantzic, Prussia, May 14, 1686, and was originally designed for the commercial profession. His inclination for natural philosophy induced him to quit that business, and having traveled through Germany and England for the purpose of enlarging his knowledge, he settled in Holland. In 1720 he first conceived the idea of using quicksilver instead of spirits of wine in the construction of thermometers, by means of which the accuracy of the instrument was very much improved. See THERMOMETER. In 1724, F. was elected a fellow of the royal society of London; and the *Philosophical Transactions* of that year contain several papers by him on points in natural philosophy. He died in 1736.

FAIDHERBE, LOUIS LÉON CÉSAR, b. France, 1818. He began a military career in Algeria in 1844; was a captain in Guadeloupe in 1848; again in Algeria in 1851-52, and, in 1854, was made governor-general of the French possessions in Senegal. He largely extended the French territory, and greatly improved the government and property of the colony. To do this, he was compelled to wage a war of extermination against the prophet El-Hadji Omar, who had formed the project of driving out all foreigners and founding an immense Mohammedan empire in central Africa. The struggle ended in 1860, by the submission of the ambitious Omar. In the war with Germany, Faidherbe had chief command of the army of the north. In 1871, he was a member of the national assembly. He was the author of valuable works on African geography and antiquities; among them, *Zénaga des Tribes Sénégalaises* (1878). He died in 1889.

FAIENCE, or **FAYENCE**, a general term for all sorts of glazed earthenware and porcelain. The origin of the name is disputed. Some derive it from Fayence, a small town of Provence; others from Faenza, a city of Italy; while certain writers consider that the isle of Majorca is at least the place where it was originally manufactured, in proof of which they appeal to the fact, that the Italians still call Faience *Majolica* or *Mayolina*.

FAILLY, PIERRE LOUIS CHARLES ACHILLE DE, b. France, 1810. He was in the army in Algeria in 1828; afterwards director of the military school at Toulouse. For services in the Crimean war, he was made gen. of division. In 1859, he was one of Louis Napoleon's aids, and was especially distinguished at Solferino. In the war with Germany, he commanded the 5th army corps. He was surprised and defeated at Beaumont, and his military career ended with the capitulation of Sedan. He d. in 1892.

FAINÉANTS ROIS (the "do-nothing kings"), the sarcastic designation of the later Merovingian sovereigns of France, under whose name the famous mayors of the palace really governed the country. The first of the do-nothing kings was Thierry III., nominally monarch of Burgundy, Neustria, and Austrasia; the others were Clovis III., Childbert III., Dagobert III., Chilpéric II., Thierry IV., and Childéric III. The last of these was dethroned in 730 A.D., and he being shut up in a monastery, Pepin le Bref, mayor of the palace, caused himself to be formally declared king. This was the end of the Merovingian dynasty; it is curious that Louis V., the last of the Carolingians, and a descendant of Pepin le Bref, also received the contemptuous epithet of *Fainéant*, as those monarchs had who were dethroned by his ancestors.

FAINTING, or **SYNCOPE** (Gr. *syn*, and *koptō*, I strike down), is a condition in which, from a sudden mental or bodily impression, the circulation of blood is temporarily arrested or very much diminished in force and volume, the respiration and the functions of the nervous system being likewise suspended. The indications of F. to a bystander are chiefly a sudden pallor, accompanied by loss of power over the limbs, with disappearance of the pulse and movements of respiration; the eyes are commonly half open or closed, the countenance bloodless, but quite at rest, and not indicative of suffering or disturbance: the flaccid, motionless condition of all the limbs also tends to distinguish simple F. from epilepsy, and the other diseases attended with spasm; whilst the vanishing of the color, and the suppression of the pulse, make a marked distinction between fainting and catalepsy (q.v.), and other forms of hysteria (q.v.); with which disorders, however, F. may in some cases be associated. The mode of origin of F., and the study of its phenomena, alike lead to the conclusion that it is primarily an impression upon the nervous system, very much of the same nature as the collapse, or shock of a severe bodily injury; this reacts, in the first instance, on the heart, and through the circulation on all the other functions of the body. F. may end in death, if too prolonged, or if associated with disease of the internal organs, and especially of the heart; hence a particular variety of F. has been separately studied, and named *syncope anginosa*, or otherwise *angina pectoris*. See HEART, DISEASES OF THE. Ordinarily, a person who faints from mental emotion, a hot and close atmosphere, or other transient cause, is readily restored by being laid on the back with the head low, and surrounded by abundance of cool fresh air. Any tight articles of dress should be loosened, and a stream of cold air, or a little cold water, should be directed to the face and neck, so as to rouse the respiratory movements. It is common, also, to apply ammonia or aromatic vinegar to the nostrils; but a more effective way of exciting the respiration is to compress the ribs, and allow them to expand again alternately, so as to imitate the natural movement. Care should be taken to ascertain that there is no obstruction in the throat or air-passages, as suffocation from mechanical causes has been mistaken for F., and the real origin of the mischief overlooked, with fatal consequences. Should all other means fail, galvanism (q.v.) will sometimes succeed in restoring the respiration and heart's action.

FAIOUM. See **FAYUM**.

FAIR. See **FAIRS**.

FAIR. JAMES GRAHAM, b. Ireland, 1831; came to the United States, 1843; went to California on the breaking out of the gold fever, 1849. After 1860, he was engaged

in mining in Nevada and amassed great wealth, becoming one of the "bonanza kings." He was elected as a democrat to the U. S. senate, 1881, and served one term. He d. in 1894.

FAIRBAIRN, ANDREW MARTIN, M.A., D.D., principal of Mansfield college, Oxford, was born near Edinburgh in 1839, and was educated at Edinburgh, Glasgow, and Berlin universities. He commenced his ministry in 1860 at Batgate, afterwards removing to Aberdeen. In 1878 he became principal of Airedale college, Bradford, England, lecturing at Edinburgh, 1881-83, on the "Comparative History of Religions." In 1883 he was selected as chairman of the Congregational Union of England and Wales, and in 1886 removed to Oxford, to become in 1888 the principal of Mansfield college. He made several lecturing visits to the United States, and published, among other books, *Studies in the Philosophy of Religion and History* (1876); *Studies in the Life of Christ* (1880); *Christianity in the First and in the Nineteenth Century* (1883); *Religion in History and in the Life of To-day* (1884); *The Place of Christ in Modern Theology* (1893); and edited in 1890 the Hibbert Lectures (1888) of Dr. Hatch. He is a frequent contributor to the *Contemporary Review*, and is widely known as a profound scholar and brilliant writer.

FAIRBAIRN, ROBERT BRINKERHOFF, D.D., clergyman and educator, was born in New York city in 1818, and educated at Trinity college and the General Theological Seminary. For some years he was rector of Christ church, Troy, N. Y. He has been principal of Catskill academy, and professor and warden in St. Stephen's college. He has published numerous pamphlets, *The Child of Faith*, *College Sermons*, *Of the Doctrine of Morality*, *The Unity of the Faith* (1895), etc. He is a vice-president of the American Meteorological Society, an associate of the Victoria Institute of Great Britain, and an hon. fellow of the Society of Science, Letters and Art of London.

FAIRBAIRN, Sir WILLIAM, Bart., was b. at Kelso, in Roxburghshire, in 1789. Having learned a little reading, writing, and arithmetic at the parish school of Mulloch, in Ross-shire, and afterwards got some six months' instruction from an uncle, he was apprenticed to an engine-wright at Percymain colliery, North Shields. When his apprenticeship terminated, F. wrought for two years in London, and then visited many places in England, Wales, and Ireland, working a short time at each, in order to observe the various practices of different localities. Eventually, he commenced business on his own account in Manchester in 1817. It was a struggle in which, without money or connections, only great abilities and perseverance would have succeeded. The first great improvement introduced by F. was the substitution of iron for wood in the shafting of cotton-mills, and the substitution of light for heavy shafting where metal was already in use. This exchange economized the cost of machinery, and enabled the motion to be speeded from 40 to 160 revolutions per minute. F. was amongst the earliest of the iron ship-builders, and originated various improvements in their construction.

The first idea of a tubular bridge across the Menai strait is due to Robert Stephenson, but its realization is due to F. more than to all other men. Stephenson's idea was a circular tube, supported by chains; but the Britannia and Conway bridges are rectangular structures, strengthened by a series of cells at the top and bottom, and without chains or any other support from pier to pier. The present form results from a long series of experiments upon model tubes—circular, egg-shaped, and rectangular—which were conducted entirely for a long time by F., and latterly, with the aid of Mr. E. Hodgkinson, as a mathematician, to deduce a law from the tabulated results of experiments. F. erected more than a hundred bridges upon this principle. See **TUBULAR BRIDGE**. F. was a fellow of the royal society; corresponding member of the institute of France, and of the royal academy of Turin; LL.D. of Edinburgh; was president of the British association for the advancement of science, 1861-62; was a chevalier of the legion of honor; and was created a baronet in 1869. His son Thomas was chairman of the art treasures exhibition at Manchester, 1857; was a commissioner for the exhibitions of 1851 and 1862; was high-sheriff of Hampshire, 1870; and was, in 1857, offered the honor of knighthood, which he declined. F., amongst other works and papers, published: *On Canal Steam Navigation*; *The Strength and other Properties of Hot and Cold Blast Iron*; *The Strength of Iron at Different Temperatures*; *The Strength of Locomotive Boilers*; *The Effect of Repeated Meltings on the Strength of Cast Iron*; *The Irons of Great Britain*; *The Conway and Britannia Tubular Bridges*; *Useful Information for Engineers*, 1st, 2d, and 3d series; and *A Treatise on Mills and Mill-work*. He died in 1874. See *Life of Sir William Fairbairn, Bart.*, by W. Pole (London, 1877); and Smiles' *Lives of the Engineers*.

FAIRBANKS, ERASTUS, LL.D., 1792-1864; b. Mass. In 1825, with his brother, he established a manufactory for scales in St. Johnsbury, Vt. Their work has a world-wide reputation. In 1836-38, he was a member of the Vermont legislature, and in 1852-53 and 1860-61, he was governor of the state. In all business and social relations he was a man of spotless fidelity and integrity. He was a liberal giver to religious and charitable objects.

FAIRBANKS, HORACE, b. Barnet, Vt., 1820. He belonged to a well-known family of platform scale manufacturers whose works are established at St. Johnsbury, Vt. He was gov. of his native state in 1876-77. He built and endowed the excellent public library at St. Johnsbury, and had wide repute as a public-spirited citizen. He d. in 1888.

FAIRCHILD, JAMES HARRIS, D.D., b. Mass., 1817; entered Oberlin college in 1839; was tutor in 1839; professor of languages in 1842; of mathematics in 1847; of theology in

1858; became president in 1866, resigning in 1889. He is the author of a work on *Moral Philosophy*, and of one on Oberlin college.

FAIRCHILD, LUCIUS, b. Franklin Mills, O., 1831; removed with his family to Wis., 1846. At the outbreak of the civil war he was made capt. of the 2d Wis. Vols., rose to brig.-gen. of vols. and capt. in the regular army, 1863; participated in 14 battles and lost an arm at Gettysburg. When he had recovered from his wound he was elected sec. of state of Wis.; served two terms; was then elected gov. and served three terms. He was appointed consul at Liverpool, 1872; consul-gen. to Paris, 1878; minister to Spain, 1880-82; elected commander-in-chief G. A. R., 1886. He d. in 1896.

FAIRFAX, a co. in n.e. Virginia, on the Potomac, intersected by the Chesapeake and Ohio and the Southern railroads; 420 sq. m.; pop. '90, 16,655, includ. colored. The surface is hilly, with considerable woodland. Chief productions, wheat, corn, oats, and butter. Washington's residence, Mt. Vernon, on the Potomac, 15 m. below Washington, is in Fairfax co. Co. seat, Fairfax.

FAIRFAX, a family of ancient English origin, long settled in Virginia. The first, THOMAS, sixth baron Fairfax (1691-1782), removed to Virginia, 1739, and became a great land-owner; GEORGE WILLIAM (d. 1787) was a son of Thomas's cousin, Sir WILLIAM; BRYAN, eighth baron (about 1730-1802), was George William's brother, and the first of the family born in Virginia; Bryan's son, THOMAS (1762-1846), was called the ninth Lord Fairfax; Thomas's grandson, CHARLES SNOWDEN (1829-69), was active in public life in California, and another grandson, JOHN CONTEL, eleventh baron (b. 1830), became a noted physician; and Bryan's great-grandson, DONALD MCNEILL (1821-94), became a rear-admiral in the U. S. navy.

FAIRFAX, EDWARD, the translator of Tasso's *Jerusalem Delivered*, was a natural son of sir Thomas Fairfax, of Denton, in Yorkshire. The year of his birth is not known. He spent his life at Fyeston, in the forest of Knaresborough, in the enjoyment of many blessings which rarely befall poets—competence, ease, rural scenes, and an ample command of the means of study. F. was alive in 1631, but he is supposed to have died in Jan., 1635. His celebrated translation of Tasso was made in the reign of queen Elizabeth, to whom it is dedicated. The first edition bears the date of 1600. For poetical beauty and freedom, it has been the theme of universal praise. Dryden ranked F. with Spenser as a master of English, and Waller said that he derived from him the harmony of his numbers. F. also wrote a treatise on *Demonology*, in which he was a believer—a credulity which was probably of no little use to him in the translation of a work full of the machinery of enchantment. This treatise is still in manuscript.

FAIRFAX, THOMAS, Lord, gen. of the parliamentary troops in England during the civil wars under Charles I., was the son of Ferdinand, lord F., and was b. in 1612, at Denton, in Yorkshire. He studied at St. John's college, Cambridge, and afterwards served as a volunteer in Holland, under lord Vere, whose fourth daughter, Anne, he married shortly after his return to England. On the outbreak of the civil war in 1642, F. warmly espoused the cause of the parliament, and was appointed cavalry-gen. under his father, who commanded the parliamentary forces in the north. He distinguished himself so much by his valor, prudence, and energy, that in 1645, when the earl of Essex resigned his office of gen. of the parliamentary forces, F. was appointed in his room. In a short time, Cromwell, who had been appointed lieutenant-gen., obtained unbounded influence over him; and from this time, although nominally head of the parliamentary forces, he really played a secondary part. At last, in June, 1650, he refused to march against the Scots, who had proclaimed Charles II. king, and Cromwell was appointed commander-in-chief in his stead. F. now withdrew into private life, and did not come forward again until after the death of Cromwell, when he showed a zeal for the restoration of the king, gathered troops for that purpose to assist Gen. Monk against Lambert; and was appointed one of the delegates dispatched to the Hague in 1660 to promote the return of Charles II. He died at Bilburgh, near York, 12th Feb., 1671. F. had a slight turn for literary pursuits, and wrote several works, prose and poetic; among others, one entitled *Short Memorials*, which was published in 1699.

FAIRFAX, THOMAS, Lord, 1691-1782; born England; educated at Oxford, and known as writer for the *Spectator*. He went to Virginia in 1739 to look after the estate inherited from his mother, the daughter of lord Culpepper, governor of the province. He found nearly six million acres on both sides of the Blue Ridge between the Potomac and Rappahannock. He employed George Washington (then but 16 years old) to survey the estate, and the intimacy then formed lasted through life, notwithstanding their radical differences in views of government. In the revolution Fairfax was on the side of England. It is said that the Yorktown surrender so wounded his national pride that it was the immediate cause of his death.

FAIRFIELD, the s.w. co. of Connecticut, bordering on New York and Long Island sound; intersected by the New York, New Haven, and Hartford, and the New England railroads; 540 sq. m.; pop. '90, 150,081. The surface is moderately even, and the soil good, producing cereals, tobacco, butter, etc. Manufacturing is largely carried on, there being more than 800 separate establishments. Co. seats, Danbury and Bridgeport.

FAIRFIELD, a co. in central Ohio; 474 sq. m.; pop. '90, 33,931. Co. seat, Lancaster.

FAIRFIELD, a co. in central South Carolina, between Broad and Wateree Rivers; 775 sq. m.; pop. '90, 28,599. Co. seat, Winnsboro.

FAIRFIELD, a town and port of entry in Fairfield co., Conn., on Long Island sound and the New York, New Haven, and Hartford railroad; 52 m. n.e. of New York. It was settled in 1639, and has a town hall, originally built in 1720 and containing records dating back to 1648; a stone powder house and four other buildings that survived the Revolutionary war; and other historic features. There are the Pequot and Memorial libraries, national and savings banks, Sturges park, churches, graded schools, and, in the village of Southport, manufactories of chemicals and rubber goods. The village of Fairfield was burned by Gov. Tryon in 1779. Pop. '90, 3,868.

FAIRFIELD, city, and co. seat of Jefferson co., Ia., on the Chicago, Burlington and Quincy, and the Chicago, Rock Island and Pacific railroads; 50 m. w. of Burlington. The city has a court-house, churches, banks, schools, a business college, Parsons college (Presb.), chartered in 1875, the Jefferson county public library, with valuable museum, manufactories of farming implements, wagons, furniture, tile, etc., water-works, electric lights, banks, and daily and weekly newspapers. Pop. '90, 3,391.

FAIR HAVEN, a town in Bristol co., Mass., at the mouth of the Acushnet River, on Buzzard's Bay, 60 m. s. of Boston. It lies opposite New Bedford, one mile distant, with which it is connected by bridges; and has a good harbor, admitting vessels drawing 18 feet of water. It is reached by the Fairhaven Branch of the New York, New Haven, and Hartford railroad. The town contains a handsome town-hall, the Millicent public library, churches, banks, and excellent public schools. There are several manufactories, producing tacks, nails, castings and glass. On Sept. 7th, 1788, Fair Haven was attacked by the British, who were repulsed by the militia under Major Israel Fearing. Pop. '90, 2919.

FAIR HAVENS, a harbor on the s. coast of the island of Crete, the port of Lasaca about 5 m. e. of cape Matala, and immediately e. of a bold headland, on the summit of which are the ruins of an ancient convent dedicated to St. Paul. On the s. of the harbor are two small islands, and between these and the shore there is safe anchorage. The apostle Paul sailed from this port in Oct., 60 A.D., and was shipwrecked on the island of Malta a few days afterwards.

FAIRIES—ELVES (Ger. *elbe*, or *elfe*; Sw. *elf*; Dan. *ellefolk*; Old Norse, *alfr*; all allied apparently to Lat. *alb(us)*, white, and signifying a bright, benign spirit; Fr. *fée*; Ital. *fata*), supernatural beings, generally of diminutive size, a belief in whom has been among the superstitions of the greater portion of the European nations. The etymology of the word *fairy* is doubtful; some derive it and the Fr. *fée* from a Celtic word '*faer*, to charm or bewitch; others associate the Fr. *fée* and the Ital. *fata* (a friendly goddess or spirit) with Lat. *fatum*, fate; others, again, trace *fairy* to the *peri* of the Persians (pronounced *feri* by the Arabians), holding it to have been brought to Europe by the crusaders. Be this as it may, the Celtic fees or fairyies are undoubtedly relics of those *matres* and *matronæ*, which appear on Gallo-Roman inscriptions as objects of popular belief. After the transfusion of the Teutonic and southern nations, the northern elves (which were originally of two kinds—the light elves, or elves proper, and the dark elves, or dwarfs) became mixed up with their Celtic kindred the fairyies in inextricable confusion.

It is generally difficult to give any scientific definition of the nature of a superstition, because its phenomena are continually varying according to time, place, and other conditions. The fairy superstition especially defies definition, because it was the peculiarity of the creatures to whom it referred that they followed no regular law, human or divine, but obeyed the impulse of their own caprice; hence every fairy tale differs from another. Still, there are distinctions and specialities that can be made out from the examination of a large number of these narratives. In the first place, the superstition peculiarly belongs to modern Europe. We find nothing like it among the idolatries of the heathen referred to in Scripture, nor does the word occur in the English Bible, or its equivalent in the original texts. In classical mythology, there is nothing nearer to it than the nymph of the fountain or grove among the Greeks. In the next place, it may be determined that the varieties in the superstition correspond, in some measure, with those of the physical geography of the districts in which it prevails. In those parts of the world where there are mountains, mists, dangerous morasses, cataracts, and stormy oceans, all superstitions, being a belief in supernatural agencies, are naturally exaggerated, and, from the dangers to which the people are liable from the agencies they deem supernatural, the belief takes deep root in their minds. Accordingly, in flat and well-cultivated countries like England, the fairy superstition is simple and homely, connecting itself with matters of domestic routine, such as the sweeping of the dwelling-house, the skimming of the milk, the preservation of the butter, and the like; while in Scandinavia and the Highlands the fairy people are connected with storms and convulsions, betray people to their death, fly away with them into the infinite cloud-land, or lead them through endless caverns within the earth. It has been observed, as a further distinction, that the fairyies of the German or Teutonic tribes are more harsh, fierce, uncemely, or deformed than those of the Celtic nations, which have a tendency rather

to the ærial and the graceful. Still, there is so great an amount of common characteristic in the superstition throughout Europe, and its peculiarities have been found so much more emphatically displayed in Scandinavia than elsewhere, as to have suggested to some the view, that the superstition is a remnant of the old mythology of the northern nations, communicated by them to a greater or less extent in all the countries over which their vikings carried their ravages.

There is a further distinction—at least in this country—between the fairies of poetic and heroic literature and those of popular belief—the former being princes and princesses of chivalry, only distinguished from human beings by their superhuman superiority in all the qualities which elicited respect in the age of chivalry; while those of popular belief are small in stature, sometimes decrepit, and endowed with dispositions generally more allied to malignity than magnanimity. It is common to all classes of them to be deemed under the condemnation of the religion of the gospel, and to be either conditionally or unconditionally excluded from the abodes of the righteous in the next world. In Ireland and the Highlands, they have been spoken of as a wandering remnant of the fallen angels. It is sometimes a symptom of geniality and kindness in a people when their fairies are supposed to be capable of earning their own redemption. Sometimes they are supposed to be human beings, metamorphosed or disembodied, and this form of the superstition has made fairyland a place of purgation for those whose sins have condemned them to it. The analogy is carried out in the belief that the services of the living can extricate the souls so situated; but it is rather through dexterity and courage than pure piety that the feat is achieved, and the rescues from fairyland form some of the most wild and exciting of the elfin narratives—as, for instance, the strange, wild ballad of *Tamlane*.

There is still another broad distinction into those that dwell in the upper air, and those that dwell within the bowels of the earth, while a third class frequent the waters. The surface of the earth on which mankind reside is not deemed the proper place of any class except on special occasions. The Scandinavians called the fairy inhabitants of the air white elves; those of the earth, black. Whatever was genial, light, playful, and benevolent in the superstition, clustered round the former; the latter did all the work that was dark, cruel, and rapacious. Naturally enough, the black or subterranean kind frequented mining districts, where they might be seen extracting the ore for themselves, and thus unwittingly leading the miner to rich veins of metal. They might be seen in an occasional peep through an aperture of a hill in their underground retreats, in chambers supported on jasper columns, where they were stowing away their hamper of gold and silver—for they were generally held to be very affluent. Some of the most exciting tales about the German gnome, and the Irish leprechaun, who was a creature of the same kind, are founded on the efforts of adventurous mortals to get possession of their riches. There exists a legend, occurring in nearly identical terms in several countries, which connects some piece of valuable plate belonging to a church with the underground fairies. The story of the horn of Oldenburg is a type of these narratives. The pictures of it represent it as a beautiful drinking vessel, in the shape of a horn, exquisitely decorated with the finest fanciful silver-work, in the style contemporary with the richest Gothic architecture. The legend is, that one day, Otho of Oldenburg, being exhausted with hunting, and very thirsty, exclaimed: "O God, would that I had a cool drink!" Thereupon there appeared before him, as if coming out of the rock, a lovely maiden, who offered him a drink in the fairy horn. He made off with it, and saved himself from evil consequences by bestowing it on the church. Hence these relics are generally in churches; but one of them is, or lately was, in the possession of an English family, and as their prosperity was traditionally believed to depend on retaining it, it was called "the luck of Eden hall."

Puck and the pixies belong to the same class of beings. Of the ell-folks of Scandinavia, the male is old and ill-favored, but the evil element in the ell-woman or ell-maid consists in her beauty, which enables her to be very dangerous to foolish young gentlemen, whom she waylays either by her own proper charms, or by personating the objects of their affections.

In Ireland, and also in the border country of Scotland, the fairy superstition has been the theme of innumerable poetic legends and mystic traditions. T. Crofton Croker, in his *Fairy Legends and Traditions of the South of Ireland*, 3 vols., 1828, presents a full and amusing account of the Irish fairies or elves, which he describes as "a few inches high, airy, and almost transparent in body; so delicate in their form that a dew-drop, when they chance to dance on it, trembles indeed, but never breaks. Both sexes are of extraordinary beauty, and mortal beings cannot be compared with them." They do not live alone, or in pairs, but always in large societies, and are governed by a queen. The same author adds: "They are invisible to man, particularly in the daytime, and as they can be present and hear what is said, the peasantry never speak of them but with caution and respect, terming them the good people, or friends. They have their dwellings in clefts of rocks, caves, and ancient tumuli. Every part within is decorated in the most splendid and magnificent manner; and the pleasing music which sometimes issues from thence in the night, has delighted those who have been so fortunate as hear it." There are Irish fairies, however, of more special character. Among these are the Banshee, or female spirit who watches a particular family; the

Cluricaune, an elf of evil disposition, who usually appears as a wrinkled old man, and has a knowledge of hidden treasure; and the Phooka, a spirit of diabolical disposition, who sometimes appearing as an eagle or a black horse, hurries the person he gets possession of to destruction. Of similar varieties are the Scottish elves: the Brownie, or domestic spirit nearly corresponding to the Banshee; the Kelpy, a kind of water-horse, being little different from the Phooka; and the Cluricaune being as regards figure somewhat analogous to the being sung by Leyden in his charming ballad, "The Court of Keilder" (*Minstrelsy of the Scottish Border*):

"Brown dwarf, that o'er the muirland strays,
Thy name to Keildar tell!"
"The brown man of the muirs, who stays
Beneath the heather-bell."

According to Irish as well as Scottish fairy superstition, the elves, though in the main harmless, or at most tricky, have the bad reputation of stealing away young children from the cradle, and substituting for them a changeling who bears a resemblance to the stolen infant, but is an ugly little creature, and never thrives. On this theft of a female infant, who is carried to Fairyland, but in the course of years returns to her parents, James Hogg founded his fine ballad of "Kilmeny" (*Queen's Wake*). It need hardly be added, that in the progress of general intelligence, the fairy superstition has disappeared in Scotland as well as the greater part of Ireland, and now is as little a matter of credence as is the belief in England of that useful drudging fiend, Robin Goodfellow. Besides being embalmed in imaginative literature, the fairy has a perpetual memorial in the small exquisitely shaped arrowheads found so abundantly in northern countries, where they were long known as elf-arrows, or bolts with which the more malignant fairies sometimes slew or injured cattle and human beings; thus, when a poor man's cow or heifer was suddenly affected with some deadly and incomprehensible illness, it was said to be "elf-shot." See ELF-ARROWHEADS.

For the most comprehensive account in the English language of the various shapes assumed by this superstition, the reader is referred to *The Fairy Mythology*, by Thomas Keightley. See FOLK LORE.

FAIR ISLE, a solitary isle in the Atlantic, 25 m. s.s.w. of Shetland. It is 4 by 2½ m. in extent, and rises 708 ft. above the sea, with high rocky cliffs and promontories. It affords copper ores, and hand-shaped sponges called "trowie gloves." Pop. '81, 214, chiefly fishers. At Stromceiler creek, was wrecked, in 1588, the duke of Medina Sidonia, admiral of the Spanish armada. He escaped, after most of his crew were murdered. From the Spaniards, on this occasion, the natives of F. I. acquired a knowledge of the art of making woolen articles, such as caps, mittens, and stockings, in divers colors, the preparation of which is still a staple employment in the island for purposes of export.

FAIR OAKS, BATTLE OF. See CHICKAHOMINY.

FAIRS (*foire*, from Lat. *forum*, a market place, or *feria*, holidays), great periodical markets, some of which are chiefly devoted to one kind of merchandise, while others, of a wider scope, afford opportunity for most of the sales and purchases of a district. F. have long been regularly held in most parts of Europe and in many parts of Asia; but as they belong rather to a state of things which is passing away, than to modern civilization, they have not been established or have not acquired the same importance in America. In Europe, they appear to have originated in the church festivals, which were found to afford convenient opportunities for commercial transactions, the concourse of people being such as took place upon no other occasion. This origin of F. is commemorated in their German name *messen*, which is derived from the word employed to denote the most solemn part of the church service. See MASS. Some festivals, from circumstances of place and season, speedily acquired a much greater commercial importance than others, and began, therefore, to be frequented by buyers and sellers even from remote parts of the world. When the ordinary means of communication between countries and of the exchange of commodities were very limited, F. were of great use. Princes and the magistrates of free cities found it to their advantage to encourage them, and many privileges were granted to them, which in some places still subsist. Courts of summary jurisdiction—commonly called *pié poudre*, from the dusty feet of the suitors—were established distinct from the ordinary courts of the county or city, for the determination of questions which might arise during the fair. In connection with all this, the practice was necessarily adopted of publicly proclaiming the commencement and duration of the fair, and this still subsists where scarcely any other vestige remains of the old privileges of F., and where they have ceased to be of any real use to the community, and might, perhaps, with advantage to all the interests of society, be now abolished, as in the case of some of the annual F. still held in the great cities of Britain.

In western Europe, the goods exposed for sale at F. are chiefly those in respect of which there is a frequent change of fashion. Provisions are seldom an article of merchandise in them; and while in some parts of the continent persons of all ranks still wait for the great yearly F. to make their principal purchases of clothing and of manufactured articles of every description—such things as corn, wine, spirits, tea,

coffee, sugar, tobacco, oil, etc., are seldom seen in them. It is otherwise, however, in places on the outskirts of civilization; and almost all the produce of great provinces is sold, and all the inhabitants require is bought at such F. as those of Kiachta and Nishnij-Novgorod. The British F. really of much use at the present day are chiefly those at which cattle are exposed for sale; of these some held on the borders of the Scottish highlands, and elsewhere in Scotland, are frequented by buyers and sellers from all parts of the kingdom, and bring together the breeders of cattle and the graziers, by whom the animals are to be fed for the butcher. Such are the F., or trysts, as they are called, at Falkirk, Doune, Edinburgh, etc. At other great yearly F. in the south of Scotland, lambs and wool are sold; and F. chiefly for the sale of the annual produce of pastoral districts are common in almost all parts of the world.

The greatest F. in the world are the Easter and Michaelmas F. at Leipsic. These are not to be confounded with the Leipsic book-fair, which is chiefly an occasion for the settlement of accounts among booksellers and publishers. Next to the Leipsic F., those of Frankfort-on-the-Main are the most important in Germany. The F. of Frankfort-on-the-Oder, and of Brunswick in Germany, of Zurzach in Switzerland, Pesth in Hungary, Sinigaglia and Bergamo in Italy, Beaucaire and Lyon in France, and Nijni-Novgorod (q. v.) in Russia, are among the most important in Europe. After the great F. of Leipsic, that called the fair of St. Peter and St. Paul at Nijni-Novgorod is the greatest in the world, and is frequented by buyers and sellers from different parts of Europe, and of northern and central Asia. The F. of Tanta in upper Egypt, of Kiachta in the south of Siberia, of Irbat, also in Siberia, of Mecca in Arabia, and of Hurdwar in western India, are also of very great importance, and are the most considerate F. out of Europe. That of Kiachta is a sort of barter-market, where almost all the commercial transactions between the Russian and Chinese empires take place. The F. in Britain have latterly sunk for the most part to insignificance, and in many instances have entirely disappeared. They were gatherings adapted to a comparatively backward state of society, when the provincial stores of goods were few, and the means of communication defective. The prevalence of good roads, populous towns with dealers in miscellaneous wares, and other tokens of advancement, have superseded the necessity for the ordinary class of F., and in consequence they have in some cases degenerated into scenes of merriment; such was Bartholomew fair, London, now extinct; also Greenwich fair, Glasgow fair, and Donnybrook fair, near Dublin; this last being likewise either extinct, or nearly so. The boisterous merriments at these F. were of old the devices employed as likely to attract a great concourse of people; hence each fair had its sport or drollery—football, wrestling, yawning, cudgel-playing, throwing at cocks, sack races, flying dragons, grinning through horse-collars, mock-giants, monstrous fishes, soaped pigs, smoking matches, eating hot hasty-pudding, whistling, wheel-barrow races. M. Bottin, the author of a statistical *View of the Fairs of France*, says that on examining his work it will appear that they were placed for the most part on the frontiers of the kingdom, or on the marches of ancient provinces; or at the foot of high mountains, at the beginning or end of the snow-season, which for months shuts up the inhabitants in their valleys; or in the neighborhood of famous cathedrals or churches frequented by flocks of pilgrims; or in the middle of rich pastures. A fair in the north of Scotland, held in June, when the nights are very short, began at sunset, and ended an hour after sunrise; it was called "sleepy market."

There are, of course, in the United States no fairs of the kind that are so common in the old world; but the term is applied to a variety of exhibitions, especially of cattle and agricultural products. In a wider sense it includes exhibitions and sales for charitable purposes, and indeed, almost any show where people are expected to bestow patronage and make purchases. During the war of the secession, what were called sanitary fairs were held in many cities of the northern states to raise funds for the U. S. sanitary commission, and their success was something entirely unprecedented. Some of the net results were as follows: The New York Metropolitan fair, \$1,184,487.72; at Philadelphia, \$1,035,398.96; Brooklyn and Long Island, \$305,513.83; Boston, \$50,000; Baltimore, \$40,234.54, etc. The most universal fairs in this country are the annual cattle shows, which are held in more than half of the 3,500 counties in the union. The originator of agricultural fairs in the United States was Elkanah Watson, a prosperous merchant of Albany, N. Y. In 1819, the state legislature, mainly through his influence, appropriated \$10,000 a year for six years for premiums on agricultural products and family manufactures. In 1832, the state agricultural society was incorporated. The county societies report to the state society, and that body reports to the legislature. A similar system prevails in many other states. Besides these regular agricultural fairs there are such exhibitions as the fairs of the American institute, of the Franklin institute, of the Maryland institute, and of many other organizations.

FAIR TRADE. See **TARIFF**.

FAIRY RINGS are spots or circles in pastures, which are either more bare than the rest of the field, or more green and luxuriant. Frequently a bare ring appears, like a footpath, with green grass in the center, and the circle which the ring forms, or of which it might form a part, is often some yards in diameter. These rings began to attract the attention of men of science in the latter part of the last century, and various hypotheses were suggested to account for them. Some imagined that they might be the effect of

Lightning. Dr. Withering appears to have been the first to ascribe them to the growth of fungi. Dr. Wollaston further investigated the subject, which has more recently been very fully investigated by Prof. Way; and it is now perfectly ascertained and universally admitted, that F. R. result from the centrifugal development of certain kinds of fungi, especially of *Agaricus oreades*, *A. gambosus*, *A. coccineus*, and *A. personatus*. The common mushroom (*A. campestris*) shows a tendency to grow in the same manner. Probably the spot where the agaric has already grown is unfitted for its continued nourishment, and the *mycelium* (spawn) extends outwards to new soil, the fungus unfitting the soil to which it extends for the immediate nourishment of grass, but enriching it afterwards by its own decay. The *mycelium* of many fungi has certainly a tendency to extend outwards from a center; and decayed fungi, containing not a little of the phosphate of potash, are a highly stimulant manure for grasses. F. R. of large size sometimes occupy the same situation for many years. The circle is almost always imperfect, some accidental circumstance having arrested the growth of the mycelium on one side.

FAITH is used by theologians in various senses. It is sometimes taken to denote the mere assent of the understanding to a set of facts or of propositions set before it; it is more peculiarly used to express the living reception by the heart of the "truth as it is in Christ." Some divines have enumerated no fewer than four kinds of F.: 1. The F. of miracles, or that immediate persuasion of the almighty presence and power of their Master, which enabled the early Christians to work miracles—a persuasion, apparently, which might exist and issue in astonishing results without being associated with moral excellence. "Though I have all faith," says St. Paul, "so that I could remove mountains, and have not charity, I am nothing." 2. Historical F., or the assent of the understanding to truth the evidence of which is irresistible, such as we have described above. 3. Partial or temporary F., such as our Lord implies in his exposition of the parable of the sower, and as appeared to animate those who, after having followed after Christ, turned back and walked no more with him; and 4. Saving F., or the persuasion of Christian truth wrought in the heart by the Holy Spirit.

These distinctions are rather theological refinements than anything else; the proper and characteristic meaning of the term F. in Scripture has little to do with any of them except the last. "Faith," says the writer of the Epistle to the Hebrews, "is the substance of things hoped for, the evidence of things not seen." It is a vision, quality, or capacity of soul whereby spiritual truth is apprehended, and spiritual life engendered. The distant is brought near by it, and substantially appropriated; the unseen is felt to be a reality. F. is the organ by which the soul passes beyond the present and the visible to the eternal and the invisible. Still more characteristically, perhaps, F. is the living affection which binds the Christian to Christ as a *Savior*. "Faith is a saving grace whereby we receive and rest upon Christ alone for salvation, as he is freely offered to us in the gospel." This is its highest and most comprehensive meaning, out of which all the others come. "What shall I do to be saved?" asked the Philippian jailer of Paul. "Believe on the Lord Jesus Christ," he replied, "and thou shalt be saved." And it is remarkable how frequently it is Christ or God—a living person—rather than any mere truth or series of truths which is represented as the proper object of Christian faith. "Ye believe in God; believe also in me." "We believe in him that raised up Jesus our Lord from the dead." "Abraham believed God, and it was accounted to him for righteousness." "Come unto *me* all ye that labor and are heavy laden, and I will give you rest."

F., therefore, in this its highest view, is nothing but trust in God and in Christ. This is the F. which "worketh by love," and "overcometh the world"—the faith of which St. Paul and St. John alike speak. The F. mentioned by St. James in apparent conflict with works is different; it seems to have been a mere religious distinction. "Thou hast faith, and I have works." One party put forth F. as their religious badge—another works. The spiritual or true meaning of either the one or the other was little regarded.

F., in the distinctly Christian sense, can only exist by the operation of God's Holy Spirit. "For by grace are ye saved, through faith; and that not of yourselves; it is the gift of God." Orthodox divines greatly insist on the necessity of this operation of the Spirit of God, yet not so as to exclude the active co-operation of man. The Pelagian and Antinomian extremes respectively throw out—the former the divine, the latter the human element. Orthodoxy combines the two, attributing to God the effective agency, but to man a real and voluntary concurrence. Some of the principal theological controversies connected with F., and not here already mentioned, will be noticed under JUSTIFICATION.

FAITH, ANALOGY OF. See ANALOGY.

FAITH-CURE, a theory, with some zealous adherents, that Christians are to be healed of bodily disease simply by means of believing prayer. This theory they profess to derive from the Scriptural doctrine of Christ's atonement: "The material and spiritual natures of man stand on a perfect equality before the atonement; so that in so far as the soul may be delivered from *sin* during life, the body may be delivered from disease, which is the fruit of sin." And they persistently declare that, in many cases, diseases which had baffled medical skill and approached a fatal stage, have been instantly healed through prayer. Among these cases are the

following: "a withered hand was, during prayer, stretched out and restored whole; a malignant cancer and a tumor, in the same person, were both instantly arrested, 'in articulo mortis,' and permanently cured; a double curvature of the spine, with paralysis of the lower limbs, was, in like manner, immediately cured; a severe case of insomnia which had continued ten years, and was advancing towards insanity, was completely cured; a minister who had suffered 25 years from a disease in the knees which made him unable to stand while preaching, during the offering of prayer in his behalf, felt a restoring process begin which ended in complete healing; a lady afflicted with a dangerous tumor, during prayer felt the beginning of a change which continued until her health was entirely restored." As an off-set to these cases (even conceding the credibility of the testimony by which they are supported) there are adduced others equally remarkable and well established, which the advocates of "faith-cure" are probably not willing to receive as involving special Divine power, such as the cures effected at Lourdes, France, in connection with prayer to the Virgin Mary, accompanied generally with the use of the water of a spring which (according to experts) has no known medicinal properties. The following are among many cited: "an eye, half destroyed by an explosion 20 years before, to which, on application of the water, accompanying the prayers, sight was instantly restored; a hand paralyzed for 10 years, straightened and restored to vigor; a child, unable to walk, wasted by fever and supposed to be dying, who, having been plunged into the water, soon went to sleep and the next day walked about the room; a woman with grievously diseased eye-lids, in whose case, on the second application of the water healing was given; a boy having a running ulcer on his neck with glandular swellings at the side, in whose case the parts were bathed with the water during the night, and in the morning the swellings were gone, and of the ulcer only a solid scar remained; a woman who had lived 24 years in pain, with paralyzed side, limbs drawn up, and flesh full of sores, and who while drinking of the water and being bathed with it, was completely cured." If it is supposed possible that the latter class of cures, however mysterious, occurred without a direct exercise of supernatural power, is not a similar supposition admissible and most natural concerning the former class?

It is not necessary, and it is not according to the Bible, to deny that certain cases of disease are subject to the prayer of Christian faith accompanied by the other appropriate remedial means; but in asserting principles and theories on this subject, it is wise to remember that the whole realm in which the spiritual laws interact with the bodily laws in man's complex nature, still awaits scientific investigation. It is not according to Divine order that healing should be sought in disregard of either of these two great departments of laws. In the prayer of faith, the spiritual and moral facts and relations will, naturally, hold the highest place.

FAITHFULL, EMILY, b. England, 1835. She was early presented at court, and introduced to fashionable life in London, but became interested in improving the condition of working women. In 1860, she established a printing office in which women were employed as compositors, with great opposition, but with the approval of the queen. In 1863, she issued the *Victoria Magazine*, a monthly advocate of her work, and in 1868, *Change upon Change*, a novel. She also delivered public lectures on the employments of women, lecturing in 1872-73 in the United States. In 1877, she began the publication of the *West London Express*, the type-setting being wholly by women. The success of this publication has led to the employment of large numbers of women, and the introduction of steam machinery into the office. She died in 1895.

FAITHORNE, WILLIAM, 1616-91, an English engraver, chiefly of portraits, and painter of miniatures. During the civil war he took the side of the monarchy, and was forced to leave the country for France where he remained till about 1650. He published *The Art of Graving and Etching* (1662), dedicated to his old master, Robert Peake.

FAITH, RULE OF, is that which determines what man is to believe concerning his origin, duty, and destiny. I. Many persons, denying either the possibility or the fact of a supernatural revelation, maintain that human reason alone, as possessed by all persons of sound mind, is both the source and ground of all religious knowledge and conviction of duty. II. Others, either denying or depreciating the authority of any external revelation, affirm that every man, in connection with his reason, yet as the enlightener of it, has an inward revelation—God with him—to which pertains the supreme authority in the belief of truth and knowledge of duty. III. The Roman Catholic church, admitting that truth supernaturally revealed is the rule of faith, teaches that the revelation actually given is partly written (as contained in the Old and New Testaments and the Apocrypha) and partly unwritten (as treasured up in divine and apostolic traditions); and that, consequently, the rule of faith includes both Scripture and tradition. And, as the people cannot surely and perfectly understand either of these, the only authorized interpreter of them both is the church, the infallibility of which is vested in the pope. Thus, ultimately, for every Roman Catholic, the rule of faith is the teaching of the infallible pope of Rome; and this, practically, for the mass of the people, resolves itself into the dictum of the parish priest, from whom they are bound to receive whatever he tells them as the judgment of the pope. IV. Protestants believe that all extant revealed truth is contained in the canonical Scriptures of the Old

and New Testaments; and therefore teach that these (received by every man, after due inquiry, as the word of God, and interpreted according to his own judgment, enlightened through the use of all accessible helps, human and divine) constitute for him the rule of faith. Among those holding this general principle of Protestantism there are recognized diversities, according as, on the one hand, the authority of the Bible—even in its letter—is intensified, or, on the other hand, the sphere of human reason in interpretation of its spirit is enlarged. Also to the *consensus* of the church are assigned differing degrees of authority in the interpretation of Scripture among different sections of Protestants.

FAKIR, a word derived from the Arabic *fakhar* (poor), and designating a member of an order of mendicants or penitents, chiefly in India and the neighboring countries. In Persia and Turkey, the word is also used for Moslem priests and dervishes (see **DERVISH**). The origin of fakirism, an institution which reaches back to the most remote antiquity, is lost in mythical darkness. The common account of the son of a mighty rajah, who, expelled from his home and country by the cruelty of his father, made a vow, half in revenge, and half in contrition, henceforth to roam a beggar through the world, and to win proselytes to a life of poverty and self-mortification, as the one most befitting in man, and most pleasing to the Deity, can hardly be called historical. The same yearning for rest, for peace, and pious contemplation, for escape from the noise and turbulence of the world, which has everywhere and always led still and pensive minds into seclusion and solitude, must naturally have been more powerful here, in a land which yielded almost of itself, and in abundance, all that was necessary for the sustenance of man—in a climate of flower and sunshine, where a hermit's calm retreat might well rise before the wearied eye in all the soft sunset hues which surround the abode of the recluse in the Ramayana, or in the Sakootala. But constant seclusion and ceaseless meditation here, as elsewhere, produced in all but exceptional minds their sad results. Piety is no longer enough; sanctity is the goal. Thus, abstinence becomes mortification and self-torture; mental repose, mystic self-absorption, or frenzied exaltation. This leaning of the Hindus to a life of asceticism was fostered by their primeval religion, which enjoins various exercises of penance and mortification upon the three higher castes in general, but upon the Brahmins in particular. These, having passed through different stages of regeneration, end by becoming Sanyassis ("who have left everything"), and are dead to the law. The world and its usages have no more any claim upon them; even religious ceremonies are no longer necessary to the "united with God." They go naked, or in filthy rags, receive the meanest food only, and that without either demand or thanks. Their ethical code consists in the observance of truth, chastity, internal purity, constant repentance, and contemplation of Deity. After these models fakirism seems chiefly to have been framed, and its adherents were not only pious men, but occasionally saints, workers of miracles, and healers of all ills, especially epilepsy and sterility. The halo which from the first surrounded fakirism, and the ready worship offered by the people, attracted to its ranks, at a very early date, many whose motives were anything but pure, and who, under a garb of humility and mendicity, collected fabulous treasures. Strabo already distinguishes these vagabonds from the more honest members of their class, and if we may trust the travelers of our own day, the more respectable element has now altogether disappeared. Their number is variously stated. In the time of Tavernier's visit, there were more than 1,200,000 Hindu, and 800,000 Mohammedan fakirs in the East Indies, and their present number is said to exceed 3,000,000. Papi describes the Mohammedans as guilty of the greater follies. At times, especially in their return from distant pilgrimages, they are even dangerous, as the killing of an unbeliever is supposed to be an infallible introduction to the glories of paradise. They live either separately as hermits or solitary mendicants, or unite in large gangs, carrying arms and a banner, beating drums, and sounding horns as they approach a town or village. Their appearance is disgusting in the extreme; they go naked, besmeared with the dung of the holy animal, the cow. Some bedeck themselves with the skins of serpents, some with human bones; others array themselves in the garb of women. Their fearful shrieks, and the hideous rollings of their eyes, add to the disgust of their appearance. Imitating madmen, they generally end by becoming madmen. The height to which self-torture is frequently carried by these wretched fanatics, and of which we meet with signs even so far back as the Ramayana, where a penitent is described as perpetually sitting with upraised arms between four fires, the sun forming the fifth, is so appalling that human nature shrinks from the mere description. Some pass their whole lives in iron cages, laden with heavy chains; some clench their fists till their nails grow through the hand; others hold aloft both their arms till they become like withered branches; while others, again, tie their hands and feet together, and roll head over heels for thousands of miles. Not the least sad feature in all this is, that these religious antics are not confined to men, but that youths, and even children of tender age, are occasionally initiated therein.

FALABA, a t. in w. Africa, 190 m. n.w. of Freetown, in Sierra Leone, on the Fala river. It was founded by the Sulimas who revolted from the Mohammedan Foulas, and its warlike inhabitants soon attained supremacy over the neighboring villages and country. The town consists of 4,000 to 5,000 small huts arranged in clusters around

squares or court-yards; and although built of clay, they are neat and in some instances even elegant.

FALAISE, a t. of France, in the department of Calvados, is situated on a lofty platform bordering on a precipice, or *falaise*, whence its name. It is situated on the Anté, a feeder of the Dive, 22 m. s.s.e. of Caen. It has three suburbs, one of them, Guibray, a mile to the e., rivals the town itself in size and population. The buildings of interest are the ecclesiastical edifices, the hospital, the public library, and, more than all, the old and ruined castle, once the seat of the dukes of Normandy, and the birthplace of William the Conqueror. In the castle, the chamber in which the Conqueror was born is still shown, as well as a tower called "Talbot's" tower, which is supposed to have been built by Talbot when lord warden of the district, after the capture of F. by Henry V. of England. F. has manufactures of cottons, hosiery, and bobbin-net. At Guibray, an important annual fair is held, at which great numbers of horses and cattle are sold. It takes place between the 10th and 25th of August. Pop. '91, 8313.

FAL'ASHAS (i.e., exiles), the degenerate Jews of Abyssinia, found in considerable numbers in the provinces w. of Takazze. It is doubtful whether they are to be ethnologically identified with the seed of Abraham, or regarded, like the Khazars of the 8th c., as, for the most part, mere proselytes to Judaism. As to the date when the race or the religion was introduced there is no authentic information, one account carrying it back to the days of Solomon and his hypothetical son Menelek by the queen of Sheba, another to the time of the Babylonian captivity, and a third only to the 1st c. of the Christian era. That one or the other of the earlier dates is probably correct may be gathered from the fact that the Falashas know nothing of either the Babylonian or Jerusalem Talmud, make no use of the tephilin, and observe neither the feast of Purim nor the dedication of the temple. They possess—not in Hebrew, of which they are altogether ignorant, but in Ethiopic (or Geez)—the canonical and apocryphal books of the Old Testament; a volume of extracts from the Pentateuch, with comments, given as they think from God to Moses on Mount Sinai; the Te-e-sa-sa Sanbat, or laws of the Sabbath; the Ardit, a book of secrets revealed to twelve saints, which is used as a charm against disease; lives of Abraham, Moses, etc.; and a translation of Josephus called Sana Aihud. A copy of the Orit or Mosaic law is kept in the holy of holies in every mesgeed or synagogue. Various pagan observances are mingled in their ritual; every newly-built house is considered uninhabitable till the blood of a sheep or fowl has been spilt in it; a woman guilty of a breach of chastity has to undergo purification by leaping into a flaming fire; the Sabbath has been deified, and, as the goddess Sanbat, receives adoration and sacrifice, and is said to have ten thousand times ten thousand angels to wait on her commands. There is a monastic system, introduced it is said in the 4th c. by Aba Zebra, a pious man who retired from the world and lived in the cave of Hoharewa, in the province of Armatshoho. The monks must prepare all their food with their own hands, and no lay person, male or female, may enter their houses. Celibacy is not practiced by the priests, but they are not allowed to marry a second time, and no one is admitted into the order who has eaten with a Christian, or is the son or grandson of a man thus contaminated. Belief in the evil eye or shadow is universal, and spirit-raisers, soothsayers, and rain-doctors are in repute. Education is in the hands of the monks and priests, and is given only to boys. Fasts, obligatory on all above seven years of age, are held on every Monday and Thursday, on every new moon, and at the Passover (the 21st or 22d of April). The annual festivals are the passover, the harvest feast, the Baala Mazalat or feast of the tabernacles (during which, however, no booths are built), the day of covenant or assembly, and Abraham's day. It is believed that after death the soul remains in a place of darkness till the third day, when the first taskar or sacrifice for the dead is offered; prayers are read in the mesgeed for the repose of the departed, and for seven days a formal lament takes place every morning in his house. No coffins are used, and a stone vault is built over the corpse so that it may not come into direct contact with the earth. The Falashas are an industrious people, living for the most part in their own villages, or, if they settle in a Christian or Mohammedan town, occupying a separate quarter. They engage in agriculture, manufacture pottery, ironware, and cloth, and are especially sought after for their skill in mason-work. Their numbers are variously estimated at from 80,000 to 200 000.

FALCHION. See **SWORD**.

FALCID'IAN LAW, so called because proposed by a Roman tribune named Falcidius. It was enacted in the time of Augustus, 37 years before the Christian era, and provided that testators could dispose of only three fourths of their property by will, and that the remaining one fourth should go to the heir. The common law imposes no such restriction, but allows a testator to dispose of his whole estate among strangers, leaving his family unprovided for. In some of the American states there are laws restricting the power of the testator in making bequests to charitable institutions. In New York one half only of a man's property, after the payment of his debts, can go to charitable uses, if a wife, child, or parent survive.

FALCON, *Falco*, in the Linnæan zoology, a genus of birds, including all the diurnal birds of prey, now known as the family of *falconidæ*; but in its present use as a generic name, limited to nearer accordance with its popular use, as a designation of those species which, in the language of falconry, were styled *noble birds of prey*. The true falcons are characterized by a bill curved from the base, the upper mandible hooked at the point, and the cutting edge of the upper mandible furnished with a strong projecting notch, or *tooth*. The claws are also sharp, curved, and strong; and in accordance with all this powerful armature, the whole frame is very robust and muscular. The legs are rather short, and have great power in striking or seizing prey. The keel of the sternum (breast-bone) is very large, and adapted for the attachment of powerful muscles; the furcula and coracoid bones (see BIRDS) are also very strong, so as to afford a sufficient resisting base for very powerful action of the wings. The wings are long and pointed, the first and third quill-feathers of equal length, the second rather the longest, the first and second quill-feathers emarginated near the tip. The true falcons are bolder in proportion to their size than any other *falconidæ*—even eagles. Their acuteness of vision is wonderful; and they have very great powers of flight. A F. is known to have traversed the distance between Fontainebleau and Malta, not less than 1350 m., in 24 hours. The speed attained by a F. in pursuit of its prey has been calculated to be at the rate of 150 m. an hour. They soar to a prodigious height in the air, always endeavoring to outsoar any bird of which they may be in pursuit, and to swoop down upon it from above; although it is far more difficult for them to rise vertically in a calm atmosphere than for birds of short and rounded wing, and they either rise obliquely—often also making their onward flight in a series of arcs—or avail themselves of the wind, and by flying against it, are borne aloft as a boy's kite is. The species are pretty numerous; some of them are of very wide geographic distribution, whilst others are peculiar to certain countries or climates. The British species are the gyrfalcon (q.v.), or jerfalcon (*F. gyrfalco*), this species formerly confused with those other British F., the Iceland F. and Greenland F.; the peregrine F. (q.v.) (*F. peregrinus*), of which the female is *par excellence* the F. of falconers (see FALCONRY), and the male is the tercel, tiercel, or tercelet; the hobby (q.v.) (*F. subbuteo*); the red-footed F., or red-legged F. (*F. rufipes*), a small species, much resembling the hobby; the merlin (q.v.), (*F. æsalon*); and the kestrel (q.v.), or windhover (*F. tinnunculus*). For the species chiefly used in falconry, see FALCONRY.

Very closely allied to the true falcons are the species constituting the genus *hierax*, very small, but remarkable for strength and courage, natives of the East Indies. The upper mandible has two notches. In the *harpagons* (*harpagus* or *bidens*) of South America, both mandibles have two notches. None of these, however, are equal to the true falcons in length of wing.

For particulars regarding the *falconidæ*, as subservient to field-sports, see FALCONRY.

FALCONE, ANCILLO, an eminent Italian battle-painter, b. at Naples in 1600. A fellow-student of Salvator Rosa's at Spagnoletto's studio, he himself subsequently became the founder of an academy of much resort. In accordance with his turbulent impulsive nature, he flung himself into the political struggles of the times, and during Masaniello's outbreak, organized his numerous scholars and dependants into a secret band, which inflicted deadly retaliation on the Spaniards. On the suppression of the insurrection, F. fled to France, but subsequently returned to Naples, where he died in 1665. The works of this painter, representing chiefly military scenes, are few in number, and costly in price; they are prized for their extreme fidelity to nature, as much as for their harmony and brilliancy of color, and their variety of expression.

FALCONER, HUGH, 1808-65; b. Scotland; botanist and paleontologist; graduated at Aberdeen, and in medicine from Edinburgh university. He went to India as assistant surgeon, where he became deeply interested in paleontology and geology. On his recommendation the culture of the tea plant was undertaken in India. In 1848, he was professor of botany in the Calcutta medical college. He was a member of many learned societies.

FALCONER, WILLIAM, was b. in Edinburgh in 1732, and was one of a family of whom all, excepting himself, were deaf and dumb. He went early to sea, serving his apprenticeship on board a merchantman; and before he was 18 years of age he was second mate, in a vessel in the Levant trade, which was shipwrecked off cape Colonna, himself and two others being the only portion of the crew saved. He published *The Shipwreck* in 1762, and during the next year he entered the navy as midshipman in the *Royal George*. When peace came, he resided in London, where he wrote a satire on Wilkes, and compiled a *Nautical Dictionary*. He proceeded to sea in Sept., 1769, as purser in the *Aurora* frigate; reached the cape of Good Hope in Dec.; and perished with his companions—the *Aurora* having gone down—in the Mozambique channel.

F. wrote several poems, but *The Shipwreck* is the one on which his fame rests. It abounds in nautical language, and has the rare merit of being interesting. It is not a great poem, but it has always had its readers and admirers. In the second edition, the author added the characters of Albert, Rodmond, Palemon, and Anna—characters bearing the same relation to actual sailors that Alexis and Chloe bear to actual shepherds and shepherdesses—and to some extent destroyed that singleness of impression which was the chief merit of his work.

FALCONET, a name used in the 15th and 16th centuries for the smallest class of cannon. The ball weighed from 1 lb. to 3 lbs., and the gun from 5 cwt. to 15 cwt. See *ILLUS.*, *CANNON*, vol. III.

FALCONIDÆ, a family of diurnal birds of prey (see *ACCIPITRINÆ*), corresponding with the Linnean genus *falco*, and exhibiting those characters of muscular vigor, armature of beak and talons, and power of flight, which are to be found in their highest perfection in the true falcons (q.v.), and in a scarcely inferior degree in the eagles (q.v.). The species are numerous; the British museum alone contains specimens of almost 200 unquestionably distinct species; but very many supposed species have been named and described by ornithologists, which, in the progress of science, have been ascertained to owe their distinctive characters merely to age and sex. The female is generally larger than the male; and the plumage of the young different from that of the adult. There are, in the different groups, considerable diversities in the curvature and strength of the bill, which also has the cutting edges of the mandibles either notched, festooned, or plain; the legs and toes also exhibit diversities as to length, strength, feathering, etc.; and in some groups, the wings are much longer, and at the same time more pointed, than in others. This is particularly the case with the true falcons, as contrasted with eagles, hawks, buzzards, kites, harriers, etc., and, in the language of falconry, the former—having the second quill-feather longest, and the first nearly equal to it—are called *noble birds of prey* (see *FALCONRY*), being those usually domesticated and trained for the service of man; the latter—having the fourth quill-feather longest, and the first very short—are called *ignoble birds of prey*, even eagles receiving this designation. The F. are distributed over all parts of the world; and almost all kinds of vertebrate animals, except the largest quadrupeds, are the prey of some of them. Some also devour insects. Like the *felidæ* among ravenous quadrupeds, the F. do not willingly feed on carrion, but generally seize and kill their own prey. As in the *felidæ*, also, there is a provision for the preservation of the claws from being blunted by unnecessary contact with the ground, or with any hard substance, the F. contracting the toes so as to elevate their claws. The F. generally live in pairs.

The *lämmergeier* (q.v.) connects this family with the vultures; the secretary (q.v.), whilst in many respects agreeing with the F., is peculiar in some of its characters.

FALCONRY, the term applied to the art of training certain of the falcon tribes to the pursuit and capture, on the wing, of birds such as the heron, partridge, lark, rook, magpie, wild-duck, pigeon, etc. In ancient times, this sport was called *HAWKING*, a term still preserved in many places, and which, perhaps, is the more strictly correct of the two. Nowadays, *falconry* is the term applied to the sport and all that pertains to it; *hawking* to its actual practice out in the field. F. is of very ancient origin, and has been traced back, as an eastern sport, to a period anterior to the Christian era. In Britain, it seems to have been followed before the time of the heptarchy; and in the celebrated Bayeux tapestry, Harold is figured with a hawk upon his hand. It seems, however, to have been practiced in eastern countries, and in central Europe, long before it became established in Great Britain; and to such a height did the sport reach in Germany, that nobles, and even kings, seem to have devoted to it the greater part of their time. As an instance of this, the emperor Frederick II. of Germany was a passionate admirer of the sport, and is said to have written a treatise on F., published by J. G. Schneider in 1788 (2 vols. Leip.). In England, after the Norman conquest, F. seems to have taken rapid strides, being much indulged in by kings, nobles, and ladies; and in those days the rank of the individual was indicated by the particular species of hawk carried on his wrist. Thus, an earl carried a peregrine falcon. In the 17th c., the sport declined; in the 18th c., it partially revived, but again fell off about the year 1725, when the art of shooting birds on the wing came into fashion. In the present day, an attempt is being made in several quarters in England to restore this noble sport, and already its restoration is being attended with growing success. In India, Persia, and other eastern countries, F. is still eagerly practiced, the methods there followed being for the most part nearly similar to those of Great Britain.

In F., two distinct kinds of hawks are used—the long-winged or true falcons, and short-winged. The first (noble birds of prey) are represented chiefly by the gyrfalcon and peregrine; the second by the goshawk and sparrow-hawk; and though for certain purposes the male is superior, as a rule the *females* of each species are much more highly esteemed for sporting purposes, from their being larger and more powerful. “Long-winged” hawks may also, as a rule, be distinguished from the “short-winged,” by their having a “tooth” or notch on the upper mandible; from the second feather of the wing being either longer, or as long, as the third; and from their impetuous “stoop” at their prey.

The gyrfalcon (q.v.) is the largest species, but from its extreme rarity in the British islands, is seldom used. The peregrine falcon is the bird in greatest favor with falconers, and if taken from the nest, as is usually the case, and carefully trained, affords better sport than any other British species.

No hawk is fit for sporting purposes until it has undergone a careful process of training. The young hawk is more easily trained than that which has been caught in a wild state, but in either case, a number of operations require to be gone through before the

sportsman ventures to take his falcon into the field. Taken from her nest on some high and dangerous cliff when nearly fledged, the *eyess*, or young falcon (with her companion-fledglings, usually two in number), is carefully conveyed to the falconer's home: there she is kept in an open shed in a nest of straw, and fed several times a day upon fresh beef, with an occasional change of birds or rabbits. At this somewhat critical period, she should never be handled, except to put on the *jesses* and *bells*, which afterwards become permanent fixtures. Her powers of flight, too, being as yet very limited, she depends upon her master for regular supplies of food, and soon learns to come for her meals at his call. Her meat is usually fixed to an apparatus termed the *lure*, and thus the hawk is early accustomed to that important instrument, the further uses of which are explained below. By degrees her powers of flight are strengthened, and she is permitted to fly at large (returning to the lure at her master's will to be fed, or in hawking language, to remain *at hack*) for several weeks, during which time her meals are gradually reduced to one a day. While at *hack*, she sometimes becomes wild, wanders far from home, and kills game for herself; and when this is the case, she is usually caught by enticing her to a bow-net, close to which a pigeon or some meat is fastened to the ground. After being "taken up" from *hack*, she is kept at the *block*—the stand upon which she sits—for a few days before her regular training begins. At this time, also, hawks require a bath twice or thrice a week.

The first of the principal operations in training is *hooding*, an operation which, if successfully performed by the trainer during his earlier efforts, paves the way for overcoming many subsequent difficulties. It demands the greatest patience and the tenderest manipulation. The hood is a cap of leather, made to fit the head of the falcon in such a manner as totally to obscure the light, a single aperture only being left, through which the beak protrudes, and a slit behind, through which are passed the braces or ties that secure the hood to the head. By shutting out the light, the hood is serviceable in tending to make the hawk quiet and tractable, but to accustom the falcon to submit to its use requires much time and great management. When, after great perseverance, this is achieved, the hawk is said to be "*made to the hood*," during which process she also learns to sit balanced upon the fist. Besides tending to induce docility by hiding the light, the hood is of further service in shutting out from view any object which might cause the hawk to flutter or *bait* off the fist or *edge* on its way to and from the field, etc. Hence the hawk is carried always hooded—the short-winged only being exempt. To the falcon's legs are attached two small hollow globes of thin metal, called *bells*; these, again, are fixed to their place by leather straps called *bewits*; and both, together with the *jesses*, become permanent fixtures even during the bird's flights. *Jesses* are two leathern straps, 5 or 6 in. in length, attached to each leg immediately below the bells; the *jesses*, again, are themselves attached to another leathern strap, called the *leash*, about four times the thickness of a boot-lace, by two rings or *varvels*; and the bird being thus caparisoned, the falconer winds the leash through his fingers, and so prevents the falcon's escape while on his wrist. Instead of *varvels*, some falconers follow the Dutch plan of using a swivel; the former method, however, is now considered the best. A long cord, called the *creance*, is further attached to the leash, and is used for the purpose of giving the bird greater freedom during her training than that afforded by the leash alone.

The *lure* is a bunch of feathers attached to a cord and tassel, and in the center of the feathers is usually a piece of spliced wood, to which a piece of meat may be attached. By accustoming the hawk to feed off the lure, or to come to it at a certain call or whistle to be fed when on the wing, the lure becomes an important adjunct to the falconer's apparatus, as by it he is enabled to entice his bird back after an unsuccessful chase. On such occasions, the falconer reclaims his bird by swinging the baited lure round and round his head, accompanying the action by some well-known call. Four wings tied together make a good lure. The *tabur stycke* and *draver* were formerly used for the same purpose as the lure, but were made in the form of a stick.

In Europe, hawks are carried on the left wrist (while in the east they sit upon the right); and to protect the falconer's hand from being injured by the bird's claws, a glove of stout buckskin leather is used. And here it may be remarked, that the claws and beak of wild caught or *haggard* falcons, are usually pared or *coped*. If the bird to be trained, instead of being a nestling, happens to be a wild one, the difficulties of training are immeasurably increased, and can only be overcome by days and nights of unwearying exertion. If it proves unusually restless and difficult to tame, it is kept on low diet, is prevented from sleeping for several days and nights, and has cold water poured upon it by means of a sponge, etc. By these and other means, the falcon gradually loses much of its restiveness, and submits with tolerable readiness to the processes of training.

For training the *eyess*, or young falcon, to the lure, as preparatory to entering at game, sir John Sebright says: "Take the hawk out while very hungry, and let an assistant swing the lure round his head steadily, and at full length of the cord; upon this the falconer casts off his hawk with the usual whistle or halloo, still holding the *creance*, and the assistant suffers the lure to fall to the ground, for fear of injury to the hawk, by striking it in the air with the two strings attached. When this lesson is perfect, the assistant, instead of suffering the lure to fall, withdraws it, and disappoints the hawk, which flies by him, and then returns, when he may be suffered to strike the lure and

feed upon it. In process of time, the creance may be removed, and the hawk enticed to the lure from a considerable distance, and may then strike it in the air (if the lure is a light one), while swinging round the head of the assistant. After a still greater time, the hawk becomes so perfect that she will circle round the head of the falconer, waiting for the lure to be thrown, and is then said to '*wait on*' perfectly. When the hawk is feeding on the lure, the falconer should encourage her, and suffer her to finish without alarm, by which she will be shown that she may do so without fear, and will readily suffer herself to be taken after flying. She should also be accustomed to horses, men, and dogs."

Having "made the hawk" to the *fist*, the *hood*, and the *lure*, she is next "entered" at her game (the *quarry*). This is done by tying a long cord or *creance* to the varvels of the jesses, and flying the hawk from the hand at a bird thrown out to it, also restrained by a cord. The hawk is next flown several times without a creance at birds *shortened in their flight*, after which it is ready to be entered at wild quarry. In case of failure, however, a live bird, similar to that at which she is flown, should be carried to the field, and thrown out to her in a creance by way of encouragement.

The heron is, and always has been, a favorite object of pursuit in British F., the period of the year best adapted for the sport being the breeding season. Having previously ascertained the feeding-place of that bird, the hawking party makes for the spot, usually towards evening, if possible in a direction *down-wind* from the heronry, so as to intercept the bird in its *up-wind* flight homewards. When a heron is seen to pass, a couple (a cast) of hawks are unhooded and "cast off," and the chase commences. The heron, seeing the falcons approach, disgorges its food, to lighten itself, and immediately ascends in the air; the hawks, eager in pursuit, and quicker of wing, speedily make upon it, and strive to gain a greater elevation by a series of beautiful gyrations. When one of the hawks succeeds in rising above the heron, it *stoops*, that is, descends swiftly, and in a direct line, upon the game, aiming a stroke with its outstretched legs and talons at its body; this the heron almost always succeeds at first in eluding, by a rapid and sudden movement aside. The second hawk, which by this time has also soared, then stoops, while the first is regaining its former altitude; and so on for many successive times, till one hawk at length clutches the heron or *binds*, upon which her companion joins her, and the three, buoyant by the motion of their wings, descend gently to the earth. The falconer's imperative duty is now to be up or near the spot where the three birds are descending, to divert the attention of the hawks before they reach the ground, and entice them from the quarry to him, by means of live pigeons as lures. This is very necessary, as the heron is extremely dangerous, and has been frequently known to injure the hawks with its sharp beak when on the ground, though it is all but perfectly harmless while in the air. When the heron's wounds have been dressed—for this bird is rarely killed in such encounters—a ring with the captor's name is usually affixed to its leg, after which it is set at liberty, and so becomes available for future sport. The falconer's usual cry of encouragement to his hawks upon the springing of the quarry, is "Hoo-ha-ha-ha-ha!" His cry when the quarry is killed, is "Whoop!" A falcon takes its prey either by tearing or *raking* it with the *hind* claw of each foot at the instant of passing, or by clutching the victim with its talons, and when she thus succeeds in binding to her quarry, she slowly descends with it to the ground. The supposition that the hawk strikes its quarry with the beak or breastbone in its swoop is a mistaken one.

Besides the peregrine falcon, the merlin is trained for F., and is extremely bold. This bird, however, is flown at small game, chiefly larks. The goshawk, though it does not soar and stoop, flies direct at its game: it is used chiefly for pheasants, rabbits, hares, etc., in an inclosed country. The sparrow-hawk, from its extreme boldness, is a great favorite, but is flown at smaller kinds of birds only, such as black-birds and thrushes, etc. The hobby is seldom or never used.

The following are the principal terms used in falconry. A falcon's legs, from the thigh to the foot, are termed *arms*; toes, *petty singles*; claws, *pounces*; wings, *sails*; tail, *train*; crop, *gorge*; lower stomach, *pannel*; feathers, hair, etc., ejected at the mouth, *the castings*. A young hawk from the nest is an *eyess* or *eyas*; one that can hop, but not fly well, a *brancher*; a nestling hawk reared at liberty, is a *hack-hawk*; a young hawk able to take game, a *soar-hawk*; a mature wild hawk is a *haggard* or *blue hawk*; young hawks taken in their migrations, are *passage-hawks*, or *red hawks*—the term *red* being applied merely as a title of distinction between the young hawk and the eyess or nestling, the colors of the two being in reality the same. The training of the passage-hawk and haggard is termed *reclaiming*; fluttering, is *baiting*; fighting with each other, *crabbing*; sleeping, *jouking*. The prey is termed the *quarry*. When the hawk strikes her quarry in the air and clings to it, she *binds*; when she flies off with it, she *carries*; when she plucks it, she *deplumes*. Dead game is the *pelt*. *Stooping* or *swooping* is the act of descending with closed wings from a height at prey. Direct flight, without soaring, is *raking off*; changing from one bird to another, *checking*. When games flies into a cover, it *puts in*. When the hawk is molting her feathers, she is *mewing*; after her first molt, she is *intermewed*; with complete plumage, *summed*; when in good condition, she is *enseamed*; when out of condition, *seamed*. Mending the feathers artificially (an operation frequently performed when one has been accidentally broken) is termed *imping*;

blunting bill and talons, *cooping*. When the falcon is obediently flying round in the air, she *waits on her master*; flying long-winged hawks from the wrist, is termed *flying out of the hood*; a couple of hawks is a *cast*. The *cadge* is a frame of wood, with four legs. It is carried by means of straps, which pass over the bearers' (the cadgers') shoulders, and is used, when there are several casts of hawks, to be taken to the field. The *block* is a round piece of wood, such as would be made by sawing a foot of wood out of a felled larch-tree of some 20 years' growth; and upon this the hawk sits when out of doors. Through the bottom of the block runs an iron spike, which being driven into the ground, secures the block to its place, and so prevents the hawk from dragging it away. Falcons are very pugnacious, and if not carefully kept separate, would soon kill each other. The *screen* or *perch* is a perch guarded by a falling piece of canvas, to support the hawks in case of their leaping down; upon this, the hawks are placed at night in an apartment called the *meros*.

The best works on the subject are those of Turberville and Latham respectively, as old treatises; and that of sir John Sebright, as comparatively modern. Of the more recent treatises, *Falconry in the British Isles*, by Salvin and Broderick; and *Falconry, its Claims and Practice*, by Freeman and Salvin, are standard authorities. See also Stonehenge's *British Rural Sports* (Lond., Warne & Co.)

The village of Falconsward, near Bois-le-Duc, in Holland, has for many years furnished falconers to almost all Europe. Sir John Sebright says: "I have known many falconers in England, and in the service of different princes on the continent, but I never met with one of them who was not a native of Falconsward."

FALEME, one of the most important tributaries of the Senegal (q. v.), into which it falls in lat. about 14° 40' n., and long. 11° 48' west. The length of its course is estimated at 200 m.

FALERII, a city of ancient Etruria, was situated w. of the Tiber, and n. of Mount Soracte. Its earliest historical appearance is in 487 B.C., when, according to Livy, the inhabitants (who were called Falisci) joined with those of Veii in assisting the Fidenates against the Romans. The Falisci were among the most dangerous enemies of Rome, and were the last of the Etrurians who submitted to its power. Their city was at last destroyed by the Romans (241 B.C.), and they themselves were compelled to choose a new site a few miles off. Here a Roman colony was settled in the time of the triumphs, whence the place took the name of *Colonia Junonia Faliscorum*. But this Roman F. does not appear to have ever acquired any importance, for the temple which anciently attracted so many pilgrims, stood on the site of the older town. During the middle ages, however, a new city sprung up on the ruins of the Etruscan F., which finally obtained the name of *Civita Castellana* (q.v.). Ruins of the Roman or later F., consisting of a part of the ancient walls, are still visible.

FALERNIAN WINE, so called from *Falernus Ager*, the district in which it was grown—and which lay in the northern portion of Campania, between the Massican hills and the northern bank of the Volturnus—was one of the favorite wines of the Romans. It is described by Horace as, in his time, surpassing all other wines then in repute. In the time of Pliny, however, Falernian wine had already, owing to a want of care in its cultivation, begun to decline in quality.

FALIERI, MARINO, a celebrated Venetian, was b. about the year 1274. He was elected in 1354, at the age of 70, doge of Venice, and was the third of his name called to this supreme dignity. At the siege of Zara, in 1346, he defeated an army of 80,000 Hungarians, vigorously pursuing at the same time extensive siege-operations, and in the course of the war, having assumed the command of the fleet, captured Capo d'Istria. Subsequently he became ambassador of the republic to Rome and Genoa. Of an ungovernable and implacable temper, his bitter resentment seems to have been roused by a grossly offensive libel on his fair and youthful wife, the author of which, a young patrician named Michele Steno, owed some grudge to the doge. The punishment awarded to the young noble by a patrician tribunal seemed to F. wholly inadequate to the offense by which his ducal dignity had been outraged, and in order to avenge this double slight, he organized an audacious plot, with the object of overthrowing the republic, and massacring the heads of the aristocracy, to be followed by his own assumption of sovereign rights. The conspiracy was, however, revealed on the eve of its execution, and F. was arrested. He suffered death by decapitation on the 17th of April, 1355. In the hall of the great council, which contains the portraits of all the doges, the space allotted to that of F. is draped with a veil of sable, and bears the following inscription: "Hic est locus MARINO FALIERI, decapitati pro criminibus." A faithful representation of the plot, and of its chief confederates, is given in Byron's drama of *Marino Falieri*.

FALK, JOHANN DANIEL, 1768-1826; b. Germany. By the fame of a volume of satires, he made his way into the best literary society of the time. When the French invaded Germany, he went into the army, and so distinguished himself at the battle of Jena that he was made a counselor of legation. In 1813, he started a society for friends in necessity, and about the same period he founded an institute for the care and education of neglected orphan children, which subsequently became a free public school. In

1804, he published *Amphytrion*, a comedy, and *Prometheus*, a tragedy. For six years he published a satirical almanac, in which he so vigorously attacked the management of hospitals, that a movement for reform was begun and resulted successfully. In 1806, he founded a critical journal called *Elysium and Tartarus*.

FALK, PAUL LUDWIG ADALBERT, b. Prussia, 1827. He was the son of a Protestant clergyman, attended the Friedrich's gymnasium at Breslau, and studied law at the university of the same city. In 1847, he entered the state service of Prussia; in 1850, he was appointed state attorney at Breslau, and in 1853 state attorney at Lyk. In 1858, he was elected to the Prussian chamber of deputies, and served as a member of the committee on petitions, budget, and military affairs, 1858-61. In 1862, he was appointed counselor of the court of appeals in Glogau, Silesia, and in 1867 was elected to represent that district in the provisional parliament of the North German union. In 1868, he was permanently assigned as privy-councillor to the ministry of justice, and devoted himself zealously to the new codification of laws for the North German union, and afterwards for the German empire. In 1871, the emperor appointed Dr. Falk one of the representatives of Prussia in the federal council, where he acted as chairman of the committee of justice, and rendered important services in the reorganization of the system of legal proceedings. In 1872, Von Mühler, the secretary of state for ecclesiastical, educational, and medical affairs, resigned; and Falk was appointed his successor. In 1872, he introduced a law, which was passed Mar. 11 of the same year, according to which the supervision of all schools was declared to be the exclusive prerogative of the state. The law was carried against the united efforts of the Roman Catholic and conservative Protestant parties of the Prussian parliament. The bishops of the Roman church made a determined opposition to the new policy, instructing the clergy in a joint pastoral letter not to lay down their offices as school inspectors without previously consulting the diocesan bishop. In a memorial addressed to the government, they declared that they regarded this law as an encroachment upon the inalienable holy right of the church. Falk, however, continued by a number of measures to assert the exclusive right of the state to legislate in all school affairs. A rescript of June 15, 1872, excluded members of ecclesiastical orders and congregations from holding positions in the public schools. In May, 1873, an act was passed conferring upon the state the right of supervising Roman Catholic seminaries. It was required also that candidates for the clerical office should undergo a certain amount of secular training at the universities, and that every ecclesiastical appointment should receive the sanction of the secular authorities. A royal tribute for ecclesiastical matters was also set up. This legislation, which the pope denounced as invalid, was disregarded by the Roman Catholic bishops, and prince Bismarck, supported by Dr. Falk, imposed penalty after penalty in order to establish the supremacy of the state. Refractory bishops were imprisoned, deposed, and banished; the contributions of the government were withdrawn from the clergy who incurred its displeasure; religious orders were dissolved; and the administration of church property was taken from the clergy and invested in bodies of laymen. These measures have been famous as the May laws. Dr. Falk lost his seat for Berlin at the general election of members of the imperial parliament in July, 1878. Puttkamer, the succeeding minister of ecclesiastical affairs, was of a conciliatory nature, and, acting on instructions from prince Bismarck, he introduced a bill popularly known as the *Canossa* bill. This new bill was a great modification of the Falk laws, and was adopted July 14, 1880, in the diet, by only 206 against 202 votes. Its period was limited to Jan. 1, 1882. The most important concession consisted in permission granted to German clergymen to be educated in institutions of learning over which the Prussian government has no control, and over which the Jesuits preside. The alleged motive was to relieve the distress of the Roman Catholic population, and to fill numerous vacancies created by former removal of refractory priests. F. was returned to parliament, 1879.

FALKIRK, a Scottish parliamentary burgh, finely situated on a rising ground in the midst of a populous mineral and manufacturing district in Stirlingshire, and overlooking an expansive "carse," through which the river Forth, with its beautiful landscapes and constant life of sailing-vessels, slowly winds its devious way. F. consists principally of a long, irregular street, where there is an equestrian statue to the duke of Wellington, erected by public subscription in 1854. In 1859 a commodious exchange was built. In 1863 excellent county buildings were erected, as well as also a new prison and county police-office. A hall, with accommodation for prosecuting various studies, was opened in 1878, for the Falkirk school of arts, and the city contains a free library and charitable institutions. A little to the s. of the town, the Union canal passes through a tunnel nearly half a mile in length. Pop. '91, 17,300. In 1600, F. was made a burgh of barony by king James VI., in favor of Alexander, lord Livingstone, afterwards earl of Callander, in whose favor also it was in 1646 created a burgh of regality by king Charles I. In 1715 it passed to the crown by the forfeiture of the earl of Linlithgow and Callander; and it was not till the passing of the reform bill in 1832 that it was made a parliamentary burgh, and received a municipal constitution, with a council of twelve, including a provost, three bailies, and seven councillors. It unites with Airdrie, Hamilton, Lanark, and Linlithgow in sending a member to parliament. It has yearly fairs, an extensive inland trade, various local manufactures, and charitable insti-

tutions. Its parish church—the Eglais Bhrec, *Varia Capella*, or Speckled Kirk of chartularies and of local tradition—has one or two monuments of some antiquity, but was itself rebuilt in the year 1810. The church, church lands, and barony belonged of old to the abbey of Holyrood. Near F., in 1298, sir William Wallace made his masterly retreat from the disastrous battle (see FALKIRK, BATTLE OF) in which he lost his brave companions in arms, sir John Graham and sir John Stewart, both said to be interred in the parish churchyard. The inscribed stone alleged to cover the grave of sir John Graham, is apparently more modern than his time. In 1746 the neighborhood of F. was the scene of another battle, in which the royal troops were defeated by those of prince Charles Edward. It was formerly noted for its cattle-trysts (cattle fairs), at which stock was yearly sold to the value of about £1,000,000. In the immediate vicinity are the Carron iron-works. F. is a station on the North British railway, and has water communication by the Forth and Clyde canal.

FALKIRK, BATTLE OF. Wallace had followed up his victory over the English near Stirling in 1297, by taking possession of some of the more important fortresses of Scotland. In the following year, king Edward, having returned from Flanders, summoned a great army to meet him at York, and marched northward to Roxburgh, and thence along the e. coast of Scotland and the shore of the firth of Forth. It was not till the day of the battle, the 22d July, 1298, that Edward first saw the enemy. The Scottish infantry, much inferior in numbers to the English, were arranged in four circular bodies on a small eminence near Falkirk, and were armed with lances, and with bows and arrows. The cavalry, numbering only 1000 men, were placed in the rear. This array was charged by the English cavalry. The Scottish footmen bravely withstood the onset of the well-appointed English horse; but the cavalry, dismayed by the preponderating numbers of the enemy, rode from the field without striking a blow. Thus left without support, the spearmen and archers were compelled to yield, and the retreat became general. The loss on the Scottish side is said to have amounted to 15,000 men. The results of this defeat were, that the military power of Scotland, such as it was, was broken; and Edward returned to England master of all the important strongholds of the south.

FALK'LAND, a royal burgh of Scotland, in the co. of Fife, is situated at the north-eastern base of the Lomond hills, 22 m. n. of Edinburgh, and 10 m. s.w. of Cupar. The e. Lomond hill rises so abruptly behind the town as to intercept the rays of the sun from it for several weeks during winter. F. was in early times a manor of the earls of Fife. It passed from them to the crown in 1425, and was made a royal burgh by James II. in 1458. Within the town are the remains of Falkland palace—a large tower (in the same style as the north-western tower of Holyrood) above a vaulted doorway leading into the courtyard, built about 1500, and two sides of a quadrangle, built between 1530 and 1550, fine and interesting examples of Scottish architecture. The palace was a favorite residence of king James IV., and after his death, in 1513, his widow, the impetuous sister of king Henry VIII. of England, was here kept in restraint for a season. Here her son, king James V., died in 1542. The last king who occupied the palace was Charles II., who passed a few days in it in 1650. Of the more ancient castle in which David, duke of Rothesay, was imprisoned and starved to death by the duke of Albany, in 1402, no traces now remain. F. is frequently alluded to in the verses of sir David Lindsay. Pop. '91, 959, who support themselves mainly by handloom weaving. See Wood's *Historical Description of Falkland* (1888).

FALKLAND, LUCIUS CARY, Viscount, was b., it is believed, at Burford, in Oxfordshire, in 1610, and educated first at Trinity college, Dublin—his father, Henry Cary, viscount F., being at that time lord-deputy of Ireland—and afterwards at St. John's college, Cambridge. Even during his father's lifetime he enjoyed an ample fortune, left him by his grandfather. His earlier years were wholly devoted to study, and to the conversation of learned men, among whom he himself, by all accounts, must have occupied a first place. His residence (Burford) was only 10 m. from Oxford, and here, according to Clarendon, "he contracted familiarity and friendship with the most polite and accurate men of that university." The praise which that historian bestows on him is extraordinary; but F. is one of those historical personages whose character and abilities we must take on the word of friends and panegyrists, if at all, for his deeds and writings are not equal to his fame. In 1633, he was made one of the gentlemen of the privy-chamber to Charles I., and took part in the expedition against the Scots in 1639. In 1640, he entered parliament as member for Newport in the isle of Wight, and was at first distinguished by his patriotic zeal for the laws and constitution of his country. Against such men as Strafford and Finch he exhibited great severity of speech, though even in their case his almost finical love of the forms of legal procedure was manifested. Shortly after, he conceived it to be his duty to assume quite a different political standpoint, and to oppose what seemed to him the excesses and illegalities of the popular party. On the breaking out of the civil war, he consequently took part with the king, though mourning deeply the miseries which his country was about to suffer. He died a soldier's death at the battle of Newbury, Sept. 20, 1643. F. was quite unfitted to play a practical part in the sanguinary politics of his time; but his genuine love of England, and of the rights of the nation, which burned in him as

strongly when a royalist as when attacking Strafford and the bishops, enables us to understand better than we might otherwise have done, the deep indignation that possessed the English gentlemen who represented the commons, at the arrogant and unprincipled policy of Charles's advisers. F. wrote various treatises, etc., the principal of which is *A Discourse on the Infallibility of the Church of Rome*.

FALKLAND ISLANDS, the only considerable cluster in the South Atlantic, lie about 300 m. to the e.n.e. of the strait of Magellan, stretching in s. lat. from 51° to 52° 30', and in w. long. from 57° 40' to 61° 20'. After having successively belonged to France and Spain, they have, since 1771, formed part of the British empire, and in 1833 they began to be settled, being, as a whole, the most southerly of the organized colonies of England. These islands number over 100, presenting a total area of about 6500 sq. m. The two largest members of the group, East Falkland and West Falkland, comprise between them more than 5000 sq. m.; and of the remainder the chief ones are Great Swan, Saunders, Keppel, Pebble, Eagle, and Jason. This possession is valuable mainly from its position with respect to the Southern and Pacific oceans, being in this connection all the more valuable on account of its many excellent harbors. Both the soil and the climate are much better adapted to pasturage than to cultivation. While the natural grass is extremely luxuriant, scarcely anything but a few vegetables is grown in the settlement. The coasts teem with fish, more especially with cod; and in certain seasons of the year, penguins and seals are killed in great numbers for the sake of their oil. The temperature is very different from that of the corresponding parallels in the s. of England—being both lower in summer and higher in winter. The mean of the former season is about 53° F., and the latter about 40°. These averages considerably exceed the vague estimates of early navigators, who, coming suddenly down from the tropical heats, appear to have felt here, by comparison, something of hyperborean cold. Though there is no timber worthy of the name, yet peat abounds to the depth of 10 feet. Pop. '71, 803; '95, 1953. Its exports are chiefly wool, with oil, hides, tallow, and skins; imports, provisions, clothing, building materials, iron-ware and machinery. The trade is almost wholly with Great Britain. A good many acres have been reclaimed for horticulture in the neighborhood of Stanley, the seat of government; and a little barley and oats is cultivated. There is only one indigenous quadruped found, a kind of fox. Sheep-raising is the chief industry, but horses and cattle are also reared. The sheep are chiefly Cheviots and Southdowns, of which the mutton finds a ready market on the spot. There are deposits of guano on West Falkland. The governor, the executive council, and the legislative council of the F. I. are all appointed by the crown.

FALL. The doctrine of the F. is the doctrine of the historical introduction of evil into the world, as described in the third chapter of the book of Genesis. The statement of this chapter, in its natural and obvious meaning, is to this effect, that the serpent, which "was more subtil than any beast of the field which the Lord God had made," tempted the woman to eat of the tree of the knowledge of good and evil, regarding which the Lord God had said, "Thou shalt not eat of it: for in the day that thou eatest thereof, thou shalt surely die." In contempt of this command and warning, "the serpent said unto the woman: 'Ye shall not surely die; for God doth know that in the day ye eat thereof, then your eyes shall be opened, and ye shall be as gods, knowing good and evil.' And when the woman saw that the tree was good for fruit, and that it was pleasant to the eyes, and a tree to be desired to make one wise, she took of the fruit thereof, and did eat, and gave also unto her husband with her, and he did eat." The result of this was, that their eyes were opened, and they knew that they were naked; and when they heard the voice of the Lord in the garden, they hid themselves; and on being summoned, they acknowledged their transgression, and were driven forth from Eden. Separate punishments, also, as the consequence of the transgression, were denounced against the serpent, the woman, and the man. The first was cursed above all cattle, and condemned to go upon its belly, and to eat dust all the days of its life. Enmity was to be put between it and the woman, and between its seed and her seed; "it shall bruise thy head, and thou shalt bruise his heel." The woman was to bring forth children in sorrow, and to be subject to her husband, to whom her desire was to cleave. The ground was cursed for the man's sake, and he was to eat of it in sorrow all the days of his life; in the sweat of his face he was to eat bread till he returned to the ground.

Such is the narrative of Genesis, upon which the doctrine of the F. is based. The doctrine assumes various forms, according to the interpretation which the narrative receives. Some theologians interpret the narrative more literally—although none can be said to do so quite literally—and others interpret it more figuratively; while others reject it altogether as a narrative, and look upon it merely as a mythical story of the early time—mirroring the lapse from a primitive golden age, or age of innocence.

1. Even the most orthodox theologians so far spiritualize the narrative, or regard it figuratively. The serpent, for example, is with them the devil, although the text in Genesis itself gives no hint of such an interpretation. The enmity between the serpent and the woman is the enmity between the devil and mankind; and the bruising of the head and the heel is supposed to represent the victorious conquest—although not without wounds and bruises—of Jesus Christ, as the Messiah, over the devil. The doctrine of

the F., according to the most common mode of interpretation, may be stated in the following terms: "Our first parents being seduced by the subtlety and temptation of Satan, sinned in eating the forbidden fruit. By this sin, they fell from their original righteousness and communion with God, and so became dead in sin, and wholly defiled in all the faculties and parts of soul and body. They being the root of all mankind, the guilt of this sin was imputed, and the same death in sin and corrupted nature conveyed to all their posterity, descending from them by ordinary generation."—*Westminster Confession of Faith*, c. vi. The F., in this view, is the temptation of our first parents to eat by the devil, and the inheritance of this act by their natural descendants. This may be said to be the orthodox doctrine of the Christian church.

2. Other theologians consider the third chapter of Genesis to be in the main allegorical—representing a picture of the violence of appetite in our first parents. In this view, the serpent is a mere imaginary accessory—the emblem of temptation; the supposed interview between God and our first parents is of the same character—the emblem of the voice of conscience following unlawful indulgence; the tree of the knowledge of good and evil represents some form of sensual indulgence. The only realities in the picture are the moral realities, conscience and temptation in some carnal form—realities which were no more powerful in the case of our first parents than they are in the case of all their descendants who yield to unlawful indulgence, as they did. The doctrine of the F., according to this interpretation, is simply the doctrine of the abuse of free will in our first parents; and the question of the relation of this primary sin to all subsequent sin, is variously regarded by this class of theologians. All of them would repudiate any formal imputation of it; yet all or most allow some actual transmission or inheritance of corrupted will, as the consequence of the original abuse of it.

The Pelagian theory maintained, indeed, that the race was not the worse of Adam's fall; but that, as our first parents "were to blame for yielding to a temptation which they might have resisted, so all of us, by a proper attention in cultivating our natural powers, may maintain our innocence amidst the temptations with which we are surrounded; and, therefore, that we fall short of that which it is in our power to do, if we do not yield a more perfect obedience to the law of God than Adam yielded." The Arminian theory, again, contended that the chief loss of the race, as the consequence of the transgression of our first parents, was the subjection to death thereby incurred, and the moral disadvantages arising out of the fear of death. Others, more orthodox than either, contend that the spiritual unity of the race necessarily implies that the depraved will of our first parents has descended to their posterity as their unhappy portion.

3. The opinion of those who look upon the chapter in Genesis as a mere myth or fable, representing a dream of the religious imagination, without any special moral meaning, cannot be said to come within the pale of Christian theology. The doctrine of the F. is with them only a devout idea, inconsistent with their principles of philosophy and history, and which, accordingly, they dismiss from their speculation or concern altogether.

FALLACY. The incorrect performance of the process of reasoning, so as to lead to error, is said to be a fallacy. The science of logic reduces sound reasoning to certain rules, and when any of these rules is violated, a logical fallacy is the result. There is always included in logical treatises a chapter on fallacies, in which the several kinds are classified and illustrated. In the old writers, there was always a division into two classes, according as the error lay in the *form* of the reasoning, or in the *matter*; the formal were entitled *in dictione*, or those appearing in the expression; the material were entitled *extra dictionem*, implying that the fault could not be detected from the language, but must be sought in a consideration of the meaning or subject-matter. As some of the designations employed in detailing these various kinds of erroneous reasoning have passed into common use, we shall first give a short notice of the ancient classification.

The formal, or those *in dictione*, were direct breaches of the laws of syllogism, or of argumentation from premises.

The fallacy of *undistributed middle* is one of the cases where what is called the middle term of a syllogism is used in two senses. "A term is said to be 'distributed' when it is taken universally, so as to stand for everything it is capable of being applied to; and, consequently, is 'undistributed' when it stands for a portion only of the things designated by it. Thus, 'all food,' or every kind of food, are expressions which imply the distribution of the term 'food'; 'some food,' would imply its non-distribution." In such a proposition as "all food is obtained from the vegetable or animal kingdoms," the term is distributed, because it is meant to be affirmed of every article used as food, that such article is derived from one or other of these two sources. But when we say "food is necessary for life," we mean only a limited number of articles. Hence such a syllogism as the following: "Food is necessary to life; corn is food; therefore, corn is necessary to life," is faulty from undistributed middle; the major proposition, "food is necessary," etc., has the form of a universal proposition, with the reality of a particular one.

The *æquivocatio*, or *ambiguous middle*, is the case where a word is used in two senses so different as to give properly no middle term, and, therefore, no connecting link

between the premises and the conclusion. A favorite example of this is the following: "Every dog runs on four legs; Sirius (the dog-star) is a dog; therefore Sirius runs on four legs." This is merely playing with the ambiguity of a word. Dr. Whately has shown that this fallacy may often arise with words derived from the same root, but acquiring from usage different significations; thus, "projectors are unfit to be trusted; this man has formed a *project*, therefore he is unfit to be trusted;" where the argument supposes that the meaning of "projector" and "one who has formed a project" is the same, which it is not.

The fallacy of *composition and division* arises by using a word distributively that is meant collectively; thus, "five is equal to two and three; two and three are even and odd; therefore five is even and odd."

"The fallacy of *accent* was an ambiguity arising from pronunciation. Thus, by a false accent in reading the commandment, "thou shalt not bear false witness against thy neighbor," it might be suggested that subornation is not forbidden, or that anything false except evidence is permitted, or that false evidence may be given for him, or that it is only against neighbors that false witness is not to be borne."

The *fallacia accidentis* is still a form of the ambiguous middle. It is when we conclude of a thing something that is only true of it accidentally, as, "wine is pernicious, therefore it ought to be forbidden." The premise is true only of the immoderate use; the conclusion refers to its use in every form. Another fallacy, the converse of this, is arguing *à dicto secundum quid ad dictum simpliciter* (passing from what is true in some respect to what is true absolutely). Of this the stock example is: "What you bought yesterday you eat to-day; you bought raw meat yesterday, therefore you eat raw meat to-day."

The most usually quoted of the second class of fallacies—*extra dictionem*—are the following:

Ignoratio elenchi, or "ignorance of the refutation." This means mistaking the point in dispute; or proving something that an opponent does not deny. This is common enough in controversy. See an example in point in *ETHICS*.

The *petitio principii*, or "begging of the question." This is when, instead of proving a position by some different position, something is assumed that is identical with what is to be proved. The most common form of this fallacy is what is termed *reasoning in a circle*, where we make two propositions mutually prove each other. The following would be an example of this mode of reasoning. Suppose we asked why smoke ascends, and any one were to answer, "because it is light;" we then inquire how it is known to be light, and the reply is, "because it ascends."

The *non causa pro causa*. This is a fallacy of insufficient induction, or the inferring a connection of cause and effect where there is only a mere sequence or accompaniment; as when we allege that the prosperity of England is due to its having an aristocracy, or an established church, or any other circumstance that has attached to the country, without ascertaining that there is any real causation between the two facts. Empiricism in medicine is of this nature; such a one took a certain medicine, and recovered from an illness, therefore the medicine was the cause of the recovery. The *post hoc, ergo propter hoc*, is another expression for the same fallacy, which is one of wide range, and whose rectification far transcends the limits of scholastic or formal logic.

The *argumentum ad hominem* is a reference to the circumstances of the party addressed, and means that although a certain reasoning may be good in itself, such party is not entitled to urge it, having perhaps already repudiated the same reasoning in other cases, or acted in a manner inconsistent with the employment of it. (For a full exemplification of fallacies according to the foregoing enumeration, see De Morgan's *Formal Logic*, Whately's *Logic*, sir William Hamilton's *Lectures on Logic*, etc.)

The subject of fallacies has received a much more comprehensive treatment in the work on logic by Mr. J. S. Mill, who has enlarged the basis of the science itself, by placing induction at the foundation of reasoning, and by recognizing the necessity of laying down rules for the correct performance of that process. See *INDUCTION*. This enables him to give a proper place to some of the preceding fallacies, such as the *post hoc, ergo propter hoc*, which, although occurring in treatises of syllogistic logic, does not violate any rule either of syllogism or of any process included in such treatises. In fact, if we take a complete view of all the cardinal operations that enter into the establishment of truth by evidence, we ought to enumerate four such operations—Observation, including experiment; definition, or the right use of general terms; induction; and deduction or syllogism. Now, any one of these operations badly performed would necessarily lead to a wrong result, in other words, a fallacy. But in addition to the mistakes arising from the admission of insufficient evidence at any point, there is a class of errors (as well as truths) that arise from our receiving propositions without any evidence at all, on the ground that they are self-evident. In every case of reasoning, we must come at last to something that does not need a reason, as, for example, the evidence of our senses, or our actual observation; but we may sometimes admit as self-evident what is really not so, owing, perhaps, to our having a strong sentiment in the matter on hand. It is usual to consider the existence of an external material world, altogether independent of our minds, as certain in itself without requiring any proof or reason for the belief. It is found that we often commit mistakes in this way, and the mistakes thence

arising Mr. Mill illustrates under the title of fallacies of simple inspection, or fallacies *à priori*, which includes the whole of what may be termed natural prejudices. The other members of his classification follow his division of the processes concerned in the investigation of truth: they are fallacies of observation, fallacies of generalization, including induction, and fallacies of ratiocination or syllogism. He remarks, moreover, that error does not often take the form of a deliberate infringement of the rules of good observation, induction, or deduction, but rather consists in a confused perception of the premises involved. In other words, it is the "not conceiving our premises with due clearness, that is, with due fixity; forming one conception of our evidence when we collect or receive it, and another when we make use of it; or unadvisedly, and in general unconsciously, substituting, as we proceed, different premises in the place of those with which we set out, or a different conclusion for that which we undertook to prove. This gives existence to a class of fallacies which may be justly called fallacies of confusion; comprehending, among others, all those which have their source in language, whether arising from the vagueness or ambiguity of our terms, or from casual associations with them." It is in this group that Mr. Mill places the *petitio principii*, the *ignoratio elenchi*, and ambiguous language generally (*Logic*, book v.).

The scholastic fallacies were considered mostly in the light of weaknesses or involuntary errors of the intellect, to be corrected by sound rules or a good method of procedure. The syllogistic logician made little count of the natural prejudices, or strong emotions and passions of mind, which forcibly pervert the intellectual views, and render men averse to sound reasoning. This grand omission was first effectively supplied in the immortal first book of the *Novum Organon* of Bacon, who, in a vigorous and telling exposition, set forth some of the most powerful prejudices of the natural mind, and their influence in corrupting science and philosophy, as well the every-day judgments of mankind. Under the name of "idola" he classed four different species of these moral sources of error, against which the mind had to be fortified, not by syllogistic rules, but by a self-denying discipline, and a highly cultivated perception of the true end of science, which was to increase human power in all the arts of life. His first class of idola were *idola tribus*, or delusions common to the human mind generally, such as errors of the senses, the over-susceptibility of the mind to impressions of sense, the limits of the human faculties, and the interference of prejudices and passions; a very comprehensive class, which even he has failed to do full justice to. The next class are *idola speciei*, idols of the den or cavern, by which he understands the peculiarities and idiosyncrasies of individuals. The third class, *idola fori*, idols of the market, are intended to include the abuses of language, or the various ways that our conceptions of things are distorted by names. The last class are the *idola theatræ*, theatrical illusions, under which he rebukes the great system-builders of antiquity, such as Aristotle, for introducing fanciful and irrelevant considerations into philosophy; and dwells especially on the corrupting influences of superstition and theology, and also the poetical tendencies of the mind, which are not satisfied with truth unless it can take on in addition a certain warmth or brilliancy of coloring.

FALLING BODIES. Owing to gravity (q.v.), all terrestrial bodies, if unsupported, *fall*, or move towards the earth's center. When a falling body is absolutely without support, it is said to fall freely, as distinguished from one descending an inclined plane or curved surface. We shall here consider the two cases of free descent and of descent on inclined planes.

1. *Bodies falling freely.*—The first fact of observation regarding falling bodies is that they fall with a variable velocity; from this we infer that they are acted upon by some force. Again, on observing how the velocity varies, we find that its increments in equal times are equal; from this we conclude that gravity is a uniform force, which it is, at least sensibly, for small distances above the earth's surface. We have next to find a measure for this force. By experiment it is found that a body in 1" falls through 16.1 ft., and that at the end of 1" it moves with such a velocity, that if it continued to move uniformly after the 1" expired, it would pass over 32.2 ft. in the next second. Hence 32.2 ft. is the measure of the velocity which has been generated in 1", and is therefore the measure of the accelerating force of gravity; for the measure of accelerating force is the velocity which it will produce in a body in a second of time. The quantity 32.2 ft. is usually denoted by the letter *g*; and it is proper to mention here that this quantity measures the accelerating force of the earth's attraction on all bodies. Experiment shows that under the exhausted receiver of an air-pump all bodies fall with equal rapidity, and that the difference of velocities of falling bodies in air is due entirely to the action of air upon them.

As the accelerating force is uniform, it follows that the velocity generated in any time, *t*, will be given by the formula $v=gt$. Since the force is uniform, it must generate an equal velocity every second. In *t'*, therefore, it must generate a velocity *gt*, since it produces *g* in 1". In 2", a falling body will be moving with a velocity of 64.4 ft.—i.e., were the velocity to become constant for the third second, it would in that second move through 64.4 feet.

We are now in a position to inquire more particularly how bodies fall, and to answer such questions as first: What time will a body falling freely take to fall through a given

space? Second: What velocity will it gain in falling through a given space? Third: How high will a body ascent when projected straight up with a given velocity? etc.

Let A be the point from which a body falls, and B its position at the end of the time t ; and let $AB = S$. Then we know that at B the body has the velocity gt . Suppose, now, the body to be projected upwards from B towards A with this velocity gt —gravity acting against it, and tending to retard its motion. We know that at the end of a time t it will be again at A, having exactly retraced its course, and lost all the velocity with which it started from B, because gravity will just take the same time to destroy the velocity gt which it took to produce it.

From this consideration we may obtain an expression for the space AB or S in terms of the time t . In the time t , the body rising from B with a velocity $= gt$ would ascend, if not retarded, a height (gt) , t , or gt^2 . But in the time t , gravity, we know, carried it through S; it will therefore, in the same time, by retarding it, prevent it going to the height gt^2 by a space $= S$. The space through which it actually ascends is then represented by the difference $gt^2 - S$; but this space we know to be AB or S. Therefore $S = gt^2 - S$; or $2S = gt^2$, or $S = \frac{1}{2}gt^2$. We may give this equation another form.

For v being the velocity acquired in the time t , $v = gt$, $\therefore t = \frac{v}{g}$. Then $S = \frac{1}{2}g \cdot \frac{v^2}{g^2} = \frac{v^2}{2g}$.

Hence $v^2 = 2gS$. From these formulæ, we see that when a body falls from rest under the action of gravity, its velocity at any time varies as the time, and the square of its velocity as the space described.

If the body, instead of starting from rest, has an initial velocity V ; and if v , as before, be the velocity at the time t , then evidently v is = the original velocity + that which is generated by gravity, or $v = V + gt$; and the space will be that which would have been described by the body moving uniformly with a velocity V + that which it would describe under gravity alone, or $S = Vt + \frac{gt^2}{2}$. With regard to the last two formulæ, it

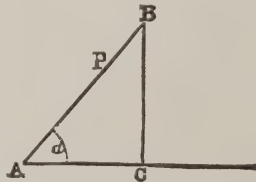
is easy to see that they may be made to suit the case of a body projected upwards with a velocity V , by a change of signs; thus, $v = V - ft$, and $S = Vt - \frac{gt^2}{2}$; gravity here acting

to destroy velocity, and diminish the height attained. From the general formulæ in the case of an initial velocity, whether the body be projected upwards or downwards, we may express v in terms of S , as we did in the case of motion from rest. For $v^2 = (V \pm gt)^2 = V^2 \pm 2g(Vt \pm \frac{gt^2}{2}) = V^2 \pm 2gS$.

These are all the formulas applicable to the case of falling bodies, and by their means all problems in this branch of dynamics may be solved. It also appears that the formulæ above investigated apply to all cases of rectilinear motion of bodies considered as particles under the action of any uniform force. In all such cases, if f measure the accelerating force $S = \frac{1}{2}ft^2$, $v^2 = 2fS$, for the case of motion from rest; and $S = Vt \pm \frac{1}{2}ft^2$, and $v^2 = V^2 \pm 2fS$, for the case of an initial velocity.

The reader can easily frame examples illustrative of the formulæ for himself. We subjoin one: A stone falls down a well, and in 2" the sound of its striking the bottom is heard. How deep is the well? Neglecting the time occupied in the transmission of sound, the formula $S = \frac{1}{2}gt^2$ applies, or $S = \text{depth} = \frac{1}{2}g \cdot 2^2$, t being 2"; \therefore depth $= 2g$, or 64.4 feet.

2. *Bodies descending inclined planes.* In this case the formulas already investigated apply with a slight change. In the figure, if P be a body on the inclined plane AB, descending under gravity, we observe that only that resolved part of gravity parallel to AB is effective to make it descend, the other part at right angles to AB merely producing pressure on the plane. The angle of inclination of the plane being a , we know (see COMPOSITION AND RESOLUTION OF FORCES) that the resolved part of gravity parallel to the plane is $g \sin. a$. The body, then, may be conceived to be descending under a uniform accelerating force $g \sin. a$. We obtain the formulæ, accordingly, for descent on inclined planes by substituting $g \sin. a$ for f in the general formulæ given above. We notice, however, that in descent on inclined planes the velocity acquired is, as in the case of bodies falling freely, due solely to the vertical height through which the body falls. By our formula, $v^2 = 2g \sin. a \cdot S$, where $S = AB$, if the body falls from B. This may be written $v^2 = 2g \cdot S \cdot \sin. a$, or $= 2g \cdot AB \cdot \sin. a$, or $= 2g \cdot BC$, since $AB \cdot \sin. a = BC$. But this is the same as the velocity acquired by a body in falling freely through BC. In fact, it holds generally true, that the velocity acquired by a body falling down the surface of any smooth curve is that due to the vertical height through which it has fallen; which might be proved in various ways, but is sufficiently clear from this, that any curve may be considered as a succession of inclined planes, indefinitely short in length, and great in number; for the proposition being true, as above proved, for each of them, will be true for all, and therefore for the curve.



For an account of the variations of the value of g , due to the earth not being a perfect sphere, and other causes, see EARTH. The reader is also referred to the article ATWOOD'S MACHINE. The theory of the descent of bodies under gravity was first discovered and taught by Galileo.

FALLING SICKNESS. See EPILEPSY.

FALLING STARS. See METEORS.

FALL OF THE LEAF. See DECIDUOUS TREES and LEAVES.

FALLMERAYER, JACOB PHILIPP, a German traveler and historian, was b. 10th Dec., 1790, at Tschotsch, near Brixen in the Tyrol; studied at Brixen, and in 1809 went to Salzburg, where he gave instructions to pupils in history and Latin. At the university of Landshut, he studied law, history, and philology. When Germany rose against Napoleon in 1813, he entered the Bavarian army, and took part in several engagements. After peace was concluded, F. returned to his studies. In 1826, he was appointed to the chair of history and philology at Landshut. In 1831, he accompanied the Russian gen., Count Ostermann-Tolstoy, in a journey to the east, visiting Egypt, Palestine, Syria, Cyprus, Rhodes, Greece, Turkey, and Italy. During 1830-40, he resided with Count Ostermann-Tolstoy at Geneva, and in the course of the next eight years twice revisited the east. The events of 1848 recalled him to Bavaria, and for a short time he sat as a deputy to the Frankfort parliament, but after 1850, he lived privately in Munich. F. was a distinguished polyglot, and spoke a great number both of European and oriental tongues. His principal works are *Geschichte des Kaiserthums Trapezunt* (Münch. 1831); *Geschichte der Halbinsel Morea in Mittelalter* (2 vols., Stuttg. 1830-36); and *Fragmente aus dem Orient* (2 vols., Stuttg. 1845). His views on the origin of the modern Greek language have excited the liveliest controversy both in Greece and elsewhere. A complete edition of F.'s works appeared at Leipsic in 1861, entitled *Gesammelte Werke von Jakob Philipp Fallmerayer*. He died in 1861.

FALLOPIAN TUBES, THE (so called after Fallopius, who is usually, but incorrectly, regarded as their discoverer), or oviducts, are canals about 4 or 5 in. in length in the human subject, opening at their inner extremity into the upper angle of the uterus or womb, and at the other end, by a fringed funnel-shaped termination, into the cavity of the peritoneum. This fringed or fimbriated extremity at certain periods grasps the ovary, and receives the ovum, which is discharged by the rupture of the Graafian vesicle. See OVARIES. The ovum usually passes along the F. T. into the uterus, where it is either impregnated by contact with one or more spermatozoa, or is absorbed. Sometimes, however, the ovum becomes not only impregnated but retained, and further developed in the F. T., thus giving rise to one of the forms of extra-uterine pregnancy.

FALLOPIUS, GABRIEL, a celebrated anatomist, b. at or near Modena, about the year 1523 (this date, however, is very uncertain), and died in 1562. If the date we have assigned is correct, he was only 25 when he was promoted from the university of Ferrara to a professorship at Pisa, whence, after a few years, he was called to Padua, to succeed Vesalius, who had been compelled by the inquisition to resign his office. See VESALIUS. Cuvier characterizes him as one of the three *savants* who restored rather than created the science of anatomy in the 17th c., the two others being Vesalius and Eustachius. After a short but brilliant career, he died at the age of 40, and was succeeded by his favorite pupil, Fabricius ab Acquapendente.

He published numerous works in various departments of medicine, of which the most important is his *Observationes Anatomice, in libros quinque digestæ*, 1561, in which he corrects many errors into which his predecessor, Vesalius, had fallen. He was the first to describe with accuracy the ethmoid and sphenoid bones, and the minute structure of the ear (the canal along which the facial nerve passes, after leaving the auditory, is still known as the aqueduct of F.); the muscles of the soft palate, and the villi and valvulæ conniventes of the small intestine. In some of his supposed discoveries, he had been long anticipated; for example, the tubes passing from the ovary on either side to the uterus, and which bear his name, were known to, and accurately described by, Herophilus and Rufus of Ephesus, 300 years before our era. In addition to his anatomical fame, he had a considerable reputation as a botanist. He was the superintendent of the botanical garden at Padua; and a genus of plants, *Fallopia*, has been named after him. A complete edition of his works, in four folio volumes, was published in 1600.

FALLOUX, FRÉDÉRIC ALFRED PIERRE, Comte de, a French author and statesman, was b. at Angers, 7th May, 1811. His family was distinguished for its legitimist zeal, and at the restoration was rewarded by receiving letters of nobility. Young F. first drew attention to himself by two works penetrated by an ardent love of the old Bourbon order of things—*L'Histoire de Louis XVI.* (Paris, 1840), and *L'Histoire de Saint Pie V., Pape, de l'Ordre des Frères prêcheurs* (Paris, 1844). These indicate the level of his political and religious faith. In the elections of 1846, he was chosen deputy for the department Maine-et-Loire. In religion, he advocated the ideas of Montalembert; in politics, those of Berryer, but united with his legitimist sentiments a love of liberty and education strangely incongruous with the historic character of his party. After the revolution of Feb., 1848, he exhibited much energy as a member of the constituent assembly, was

one of those who organized the resistance to the insurrection of the 15th May, and, as reporter on the national workshops, pronounced for their immediate dissolution. He was also one of the most ardent promoters of the expedition to Rome. After the election of Louis Napoleon to the presidency, F. was appointed minister of public instruction, an office which he held only for ten months. After the events of the 2d Dec., 1851, he retired from public life to a country-seat near Angers, where he occupied himself with agricultural pursuits. In 1857, he was admitted a member of the French academy, and in the same year published at Tours his *Souvenirs de Charité*. He published in 1859 *Mme. Swetchine, sa Vie et ses Œuvres*; in 1863, *Méditations et Prières*; in 1864, *La Convention du 15 Septembre*; in 1865, *Itinéraire de Turin à Rome*; and in 1866, *Lettres inédites de Mme. Swetchine*. In 1869, he attempted to re-enter the assembly for the 3d circonscription of La Vendée, but was defeated by the official nominee. He d. 1886.

FALLOW (from the same root as Ger. *fahl* or *falb*, Lat. *fulvus*, expressing a pale dun, tawny color). This word sometimes signifies waste, untilled land; but usually it is applied to land that is plowed and otherwise stirred, for a season without being cropped. The most of the wheat raised by the Romans was sown after the land was fallowed; indeed, the usual rotation was fallow and wheat alternately. It was only fertile soils that could long support such an exhausting system; hence resulted the decreasing produce which the later Roman agricultural authors so often speak of and lament.

The fallowing of land was introduced into all the countries which fell under the dominion of the Romans. During their sway in Britain, it soon exported large quantities of wheat; and for centuries after the Romans left it, no other mode of cultivating the land was followed. It may here be observed, that wherever the system of fallowing, without giving manure to the crops, is practiced, it necessarily supposes that the soil is at least moderately fertile. This system is most successful on argillaceous soils, which are retentive of organic manure. It must be borne in mind that the chief use of fallow is to liberate the plant-food which is already stored up in the soil as organic matter. The plowing and stirring, by admitting air, promotes decomposition, in the same manner as the turning over of a dunghill does; it also destroys the roots of the weeds that impoverish and choke the crops.

It was long before fallowing was introduced to any extent in Scotland; but about the beginning of the present century, it was largely practiced. Owing, however, to the draining of the soil, and the extension of the green-cropping system, it is now confined to the most retentive clay-soils, where it affords the only means of thoroughly cleaning the land. In a rotation of beans, clover, oats, fallow, wheat, and barley, each field is subjected to a process of fallowing once in every six, seven, or eight years, according to circumstances.

Fallow-fields usually receive a deep furrow in autumn. Lying exposed through the winter, the frost pulverizes the surface. In spring, when the weather becomes dry, the cultivator or the plow opens up the soil, and the process of extirpating the weeds goes on. Sometimes as many as three or four furrows are given in summer before the seed is sown in autumn. In old cultivated countries, land is commonly so much reduced in its organic matter, that fallows receive dressings of farm-yard manure, rape-dust, or guano, to obtain fertility.

Since the general introduction of green crops, the term fallow has departed in some measure from its original meaning. These crops are sown on what was formerly the fallow-break, and are now often styled fallow-crops. The land, no doubt, receives in some measure a fallowing, as the green crops are cultivated by the plow during their growth. Bastard-fallowing is a term which is used in Scotland when hay-stubble is plowed up in the end of summer, freed from weeds, and sown with wheat in autumn.

Where no express stipulation on the subject has been introduced into the lease, it has been held in Scotland, that, as the outgoing tenant might have taken a crop from the land, which, in accordance with the most approved principles of agriculture, he ought to leave fallow, and as the incoming tenant reaps the advantage in case of his abstaining from doing so, he is entitled to claim its value (Purves, Dec. 3, 1822. See Bell's *Principles*, s. 1263). "This decision," says Mr. Hunter (*Landlord and Tenant*, ii p. 458), "has been deemed to have fixed the law." In conformity with the same principle, it has been ruled, that if the outgoing tenant received prepared fallow, the like should be left by him. A tenant who, on entering to his farm, had received a certain extent of fallow, prepared with manure, free of expense, was held bound to leave the same amount of fallow and manure as he had received, and to be entitled to claim payment only for the surplus (Brown v. College of St. Andrews, 11th July, 1851). But where a portion of land has been expressly reserved in the lease for fallow and green crop, for which the tenant was to receive merely a certain sum per acre for plowing, the rights of the parties are settled by the contract, and the tenant can claim no additional sum for fallow (Sheriff v. Lord Lovat, 13th Dec., 1854).

FALLOW CHAT. See WHEATEAR.

FALLOW DEER (*Dama vulgaris* or *Cervus Dama*), a species of deer well known in Britain, being very commonly kept in *parks*, as it is also in most parts of Europe. It is probably a native of the countries around the Mediterranean, and has been introduced by man into the more northern parts of Europe, where it is, however, now in some

places to be found wild in forests. It is doubted whether it has not been introduced by man, at a remote period, from the n. of Africa even into the s. of Europe, in all parts of which it is now at least completely naturalized. How far its geographic range extends eastward, is not very certainly known. It is represented in the sculptures of Nineveh. Its introduction into Britain is ascribed to James VI. of Scotland, who is said to have brought it from Norway when he brought home his queen, Anne of Denmark, and after his accession to the English throne, to have transported it to Enfield and Epping. Thousands of F. D. now exist in some of the English parks. They generally receive some attention and supplies of fodder in winter.

In size, the F. D. is smaller than the stag or red deer, from which it also differs in its broad palmated antlers, its longer tail, and its smoother and finer hair. In color, it is generally yellowish-brown in summer; darker, or even blackish-brown in winter; more or less spotted with pale spots, particularly in summer and when young; but in one variety the spots are very marked; in another they are not to be observed even in the young. The buttocks are white, and a dark line passes along the back. White F. D. are sometimes to be seen. The female has no horns. The male is called a BUCK (Fr. *daim*), the female a DOE (Fr. *daine*), the young a FAWN (Fr. *faon*). The name F. D. is derived from its color. See the article FALLOW, in agriculture. When the F. D. and red deer are kept in the same park, the herds seldom mingle, nor do hybrids occur. The F. D. loves the woods. The flesh of the F. D. is one of the most esteemed kinds of venison. The remains of fossil species nearly allied to the F. D. occur in some parts of Europe. The great fossil Irish *Elk* (q.v.) is allied to it.

FALL RIVER, a co. in s.w. South Dakota, touching Wyoming and Nebraska, formed 1875 from original territory and named Forsyth; organized 1883; 1770 sq.m.; pop. '90, 4478. It is drained by the south fork of the Cheyenne river. The northern part includes a portion of the Black Hills, and the southern part is rolling; soil very fertile and mineral deposits valuable. Co. seat, Hot Springs.

FALL RIVER, a city and port of entry in Bristol co., Mass., near the boundary of Rhode Island, at the mouth of Taunton river, where it falls into Mount Hope bay, 49 m. s. of Boston. It was once a part of Freetown, and was incorporated separately in 1803. A few years later it was called Troy, but the first name was restored in 1834. In 1862, F. R., in Newport co., R. I. was annexed. The city charter dates from 1854. It has risen to be one of the most important manufacturing centers in the country. A line of large and splendid steamboats connects it with New York, and it is reached by several branches of the New York, New Haven and Hartford railroad. The harbor is large and deep, and admits the largest vessels. The city stands on high ground, covers about 28 sq. m., and contains many handsome churches and dwellings built of the granite found in the vicinity. The stream called Fall river is the outlet of Watuppa lake, a body of water 10 miles long, e. of the city, and descends about 140 ft. in half a mile to the bay. Along its narrow valley are many mills and factories, but steam is now largely used by them. This same lake supplies water for drinking, etc., by works constructed at a cost of \$1,500,000. The manufactures include cotton goods, prints, woollens, nails, machinery, carriages, soap, hats, shoes, and articles connected with the cotton industry. Estab. 1890, 397; capital, \$37,199,470; hands, 23,542; value of products, \$32,519,281. In 1896 there were 81 cotton mills, operated on a capital of \$25,000,000, and having 2,833,691 spindles, 67,352 looms, 27,954 employees, and an annual production of 808,500,000 yards of cloth. The city is lighted by gas and electricity, has an inexhaustible supply of the purest water from the lakes just back of the city, and a complete system of sewerage, and is provided with electric railroads connecting with the neighboring cities and towns. Public parks have been laid out in various parts, and there are beautiful drives to the suburbs. The most notable building is the B. M. C. Durfee High School, a granite structure, occupying an entire square, with astronomical observatory, tower, clock, and chimes. There are also a new public library building, several circulating libraries, new state armory, over 50 churches, nearly 100 lodges of benevolent organizations, public school property valued at nearly \$1,000,000, national, savings, and co-operative banks, and a large number of daily and weekly newspapers. Pop. '90, 74,398.

FALMOUTH, a parliamentary and municipal borough and seaport in the s.w. of Cornwall, on a w. branch of the estuary of the Fal, 14 m. n.n.e. of Lizard point, and 269 m. w.s.w. of London. It chiefly consists of a narrow street, a m. long, on the s.w. of the harbor, and of beautiful suburban terraces and villas on the heights behind. The harbor, one of the best in England, is formed by the estuary of the Fal, which is 5 by 1 to 2 m. in extent. The mouth is defended on the w. by Pendennis castle, situated on a rock 198 ft. high, and which resisted a siege by Cromwell for six months; on the e. by Mawes castle, both built by Henry VIII. Pop. '91, 4273, but within the limits of the borough as enlarged in 1892, about 12,800.

FALSE, RULE OF, or FALSE POSITION, is a mode of reckoning in cases where a direct solution of the question is impracticable. Any number is chosen at hazard, as that which is sought; this *false position* of course gives a false result, and from the

amount of the error, it is ascertained by proportion what the assumption ought to have been. *Ex.* what number is that whose half exceeds its third by 12? Assume 96 at random; 48—32 gives 16, which is too great; $\therefore 16 : 12 :: 96 : 72$, the number required. This method is now mostly superseded by the use of equations.

FALSE BAY, an inlet which may be referred either to the Atlantic, the Southern, or the Indian ocean. It washes the e. side of the mountainous district of s. Africa, which terminates in the cape of Good Hope, and extends eastward along the coast as far as False cape, measuring about 22 m. in length, and about the same in breadth. F. B. is, of course, sheltered from the n.w. monsoon, to which Table bay—the harbor of Cape Town—is exposed, an advantage which is more especially possessed by Simon's bay at its n.w. extremity. Hence, besides periodically receiving trading-vessels from Cape Town for temporary protection, it is permanently the station of the naval force of the colony.

FALSEHOOD. See **FRAUD**.

FALSE IMPRISONMENT. Every confinement of the person is an imprisonment, whether it be in a common prison or a private house, or in the stocks, or even by forcibly detaining one in the public streets (Coke, *Inst.* ii. 482). A man is liable for detaining the person of another, not only without cause, but without legal cause. Thus, where a man gives another in charge for committing an offense, the former is liable, to an action for F. l., if he fails to substantiate his cause. Police-officers, also, are liable for apprehending a man without a competent warrant, or without reasonable suspicion. But where a felony has been committed, an officer is entitled to arrest on suspicion. Not only constables but private persons may arrest a man who commits a felony in their presence. A person who has falsely imprisoned another is liable to a criminal prosecution, and also to a civil action. In the former case he may be punished by fine and imprisonment; in the latter, he must pay such damages as are awarded. Any one detained without sufficient cause is entitled to apply for a writ of *habeas corpus* (q.v.) to procure his liberation. In Scotland, this species of offense is called *wrongous imprisonment*.

FALSE NEWS or **RUMORS.** Spreading false news to make a discord between the sovereign and nobility, is a misdemeanor, and punishable by the common law of England with fine and imprisonment. By statute of Westminster the first, c. 34, this penalty is confirmed. This statute is said by lord Coke to have been passed in consequence of the rebellion of Simon de Montfort (Coke, *Inst.* ii. 226). The law before the conquest had been more severe, and required that the author and spreader of false rumors should have his tongue cut out, if he redeemed it not by estimation of his head (or capitation tax). One of the articles against cardinal Wolsey was founded on this principle of common law. "Also, the said cardinal has busied and endeavored himself by crafty and untrue tales against your nobles of your realm."—Coke, *Inst.* iv. 92. The feeling of the present day is more in accordance with the axiom of Tacitus, *Convicia, si irascaris, tua divulgas, spreta exolescunt* (If you seek to revenge slanders, you publish them as your own; if you despise them, they vanish).

FALSE POINT, a harbor in the Cuttack district of Orissa, one of the best on the coast of India; lat. 20° 20' n., long. 86° 4' e.; the anchorage is safe, roomy, and completely land-locked. It is a regular port of call for Anglo-Indian coasting steamers. There is a large export trade with Mauritius, and other French colonies.

FALSE AND PRETENDED PROPHECIES, with intent to disturb the public peace, are punishable by several old statutes. By 33 Henry VIII. c. 14, this crime is made a felony; but by 3 and 4 Ed. VI. c. 15, continued by 7 Ed. VI. c. 11, and by 5 Eliz. c. 15, the punishment is restricted to one year's imprisonment and forfeiture of £10 for the first offense; and for the second offense, imprisonment for life, and forfeiture of all chattels. These statutes apply to a particular class of prophecies—viz., prophecies "upon or by the occasion of any arms, fields, beasts, badges, or such other like things accustomed in arms, cognizances, or signets; or upon or by reason of any time, year, or day, bloodshed, or war, to the intent to make rebellion," etc. This description refers to predictions founded upon the heraldic bearings of particular families, which, in the state of public feeling at the time when the statutes were passed, might have been productive of discontent and sedition. The statutes are unrepealed, but are not likely in the present day again to be put in force.

FALSE PRETENSES, OBTAINING MONEY BY. By the common law of England, a man is not punishable as a criminal who has induced another, by fraudulent representations to part with the property of money or goods, unless the loss occasioned by the deception be of a public nature. Larceny or theft was the only species of wrongful abstraction of articles of value which was recognized, and where the consent of the owner to the transaction was obtained, no matter how fraudulently, the loser was left to a civil action for his relief. To remedy this effect in the law, the 33 Henry VIII. c. 1 was passed, whereby it was enacted that if any person should falsely and deceitfully obtain any money, goods, etc., by means of any false token or counterfeit letter made in any other man's name, the offender should suffer any punishment short of death, at

the discretion of the judge. This statute, however, only reached the case of deception by use of a false writing or token; the 30 Geo. II. c. 24 was therefore passed for the purpose of including all false pretenses whatsoever. Further alterations were made by subsequent statutes, until, by 24 and 25 Vict. c. 96, the previous legislation on the subject was consolidated. This is now the ruling statute in regard to false pretenses. The general principle is that, wherever person fraudulently represents as an *existing fact* that which is not an existing fact, and so gets money, etc., that is an offense within the act (*Reg. v. Woolley*, i. Den. C. C. 559). The false pretense must relate to some present fact, and therefore a promise merely to do some act is not such a false representation as will sustain a conviction. It is not necessary that the deception should be by words or writing, but any act tending to deceive will bring a person within the statute. Thus, a man at Oxford wearing a cap and gown, in order to induce a tradesman, of whom he ordered goods, to believe that he was a member of the university, is sufficient to warrant a conviction. The deception practiced, however, must not be simply as to the *quality* of an article, for this is regarded as merely a dishonest trick of trade, and not criminally punishable; it is also necessary that the owner should be deceived by the pretense; and where a tradesman is induced to part with goods to a regular customer, making a false statement, not on account of the statement, but from his belief in the credit of the party, the transaction is not punishable under the act. By 24, 25 Vict. c. 96, ss. 88 to 90, it is enacted that it shall be no bar to a conviction that the crime, on being proved, amounts to larceny, and that it shall not be necessary to prove an intent to defraud any particular person; that the delivery of money, etc., to another person, for the benefit of the party using the deception, and also the obtaining signature to, or destruction of, a valuable security, etc., by a false representation, shall subject the offender to punishment. The same statute, ss. 46 and 47, contains a salutary provision, that any person attempting to extort money by threatening to accuse another of certain felonies, or of an infamous crime, is liable to penal servitude for life.

In the United States there is a very great variety of offenses recognized by the laws of many of the states in which the element of false pretense is the essence of the offense. The laws of N. Y. are a fair example of the general law on this point. It is there made a criminal offense to conspire to obtain property by false pretenses, or in such a way to win money, to obtain accommodation at a hotel, to obtain employment or appointment to any position. So a person who, with the intent to deprive the true owner of his property obtains from him the possession thereof by false pretenses, is guilty of larceny. Obtaining money or signatures by such means for any alleged charitable purpose is punishable by imprisonment from one to three years. It is a felony to obtain money by means of a false draft or check of a banking company not in existence, or by note of a corporation, not in existence. But it is also said that a purchase of property by means of a false pretense is not criminal, where the false pretense relates to the purchaser's means or ability to pay, unless the pretense is made in writing and signed by the party to be charged.

FALSE SIGNALS. By 7 Will. IV. and 1 Vict. c. 89, s. 5, the exhibiting any false light or signal, with intent to bring any ship or vessel into danger, is made felony, and punishable with death. The felonious intent may be proved by declarations made by the accused, or by circumstances which fairly lead to the conclusion of a guilty purpose. The punishment of death is recorded, but is not in fact carried out.

FALSE SWEARING. By 19 and 20 Vict. c. 79, s. 178 (bankruptcy, Scotland), any person guilty of falsehood in any oath made in the pursuance of the act, shall be liable to a prosecution at the instance of the lord advocate, or of the trustee in the sequestration, with consent of the lord advocate. But in the latter case, the prosecution must be authorized by a majority of the creditors present at a meeting called for the purpose. The person, on conviction, is liable, in addition to the punishment awarded, to forfeit, for behoof of the creditors, his whole claim under the sequestration. In England a bankrupt is not put upon oath; but on making a false declaration, he is deemed guilty of a misdemeanor and punishable with the penalty of perjury.

FALSET, or **FALSETTO**, a term in singing for the highest register of a man's voice, which joins the natural or chest voice, and which, by practice, may be so blended with the chest-voice as to make no perceivable break.

FALSE VERDICT. The remedy in cases where it was alleged that a F. V. had been returned, was formerly by means of a writ of attain. This writ originally lay only in cases where the jury had returned a verdict on their own knowledge of the facts, and proceeded on the assumption that, in returning a F. V., they were necessarily perjured. The case was heard before 24 men, and in case the original verdict was found bad, the jurors incurred the penalty of infamy and forfeiture of their goods. By statute of Westminster the first, c. 34, a writ of attain was allowed upon an inquest; i. e., where cases had been decided upon evidence adduced. But the universal rule now established is, that though in most civil cases a new trial may be had for various causes, in no case can jurymen be punished, though finding a verdict against evidence.

FALSE WEIGHTS AND MEASURES. The use of false weights and scales is an offense at common law in England, and punishable by imprisonment. In Scotland, by 1607 c. 2, the users of false weights are punishable by confiscation of movables.

FALSIFYING RECORDS. The injuring or falsifying any of the documents of a court of justice is, by several English statutes, made a serious offense. Any person obliterating, injuring, or destroying any record, writ, etc., or any original document belonging to any court of record or of equity, is guilty of felony, and is liable to be kept for 3 years in penal servitude, or be punished by 2 years' imprisonment, with or without hard labor, 24 and 25 Vict. c. 96, s. 30. By 24 and 25 Vict. c. 98, s. 28, any person employed to furnish certified copies willfully certifying any document as a true copy, knowing the same is not so, is guilty of a felony, and subject to 7 years' penal servitude. This act does not extend to Scotland. By 1 and 2 Vict. c. 94, any person employed in a public record office certifying any writing to be a true copy, knowing the same to be false in any material part, is guilty of felony, and may be punished with penal servitude for life.

FALSTER, a Danish island in the Baltic, s. of Seeland, lies between lat. 54° 30' and 54° 58' n., and between long. 11° 45' and 12° 11' e. It is separated by the strait called the Grönsund from the island of Moen, and by that called the Guldborgsund from the island of Laaland, F. is about 30 m. long, and from 2 to 13 m. wide, and has an area of about 178 sq. miles. It is flat, remarkably fruitful, and well cultivated, so that it resembles an attractive garden, and maintained in 1890 32,639 inhabitants, who employ themselves chiefly in agriculture and cattle-breeding. The low and swampy districts are productive of malarial fevers. The chief town is Nykjöbing, on the Guldborgsund. It is very old, has a castle and a cathedral, some commerce and shipbuilding. The only other place of any note is Stubbekjöbing.

FALUN, or **FAHLUN** (called also *Gamla Kopparberget*, i. e., the "old copper-mine"), is a t. of Sweden, capital of the län, or province, of the same name. It has long been famous for its copper-mines, though the quantity of ore now obtained is much smaller than formerly. In 1650 the yield was 3000 tons annually; this, however, declined, in 1690, to 1900 tons; while at present it is much less. Gustavus Adolphus called the mines the "treasury of Sweden." The excavations extend for miles underground, containing vast chambers, where Bernadotte, the late king, gave splendid banquets, on which occasions the mines were brilliantly lighted up. F. is regularly built, and its houses are of wood, and blackened by the fumes of the numerous smelting-furnaces. Pop. '90, 8085.

FALUNS, a term given by the agriculturists of Touraine to shelly sand and marl, which they use as manure, and applied by geologists to the deposits from which they are obtained. They are loosely aggregated beds of sand and marl, but occasionally so compacted by calcareous cement as to form a soft building-stone. The animal remains contained in them are chiefly marine, and of a more tropical fauna than that of the Mediterranean. A few land and fluviatile mollusca are found mixed with the oceanic forms, and with these are associated the remains of terrestrial quadrupeds, as *dinotherium* (q. v.), *mastodon* (q. v.), *rhinoceros* (q. v.), etc.

FAMA (Gr. *pheme*) the goddess of rumor, appears in the works of the earliest poets. Sophocles makes her the child of Hope; Virgil, the youngest daughter of Terra, the sister of Enceladus and Cæus.

FAMA CLAMO'SA, in the ecclesiastical law of Scotland, is a wide-spread report, imputing immoral conduct to a clergyman, probationer, or elder of the church. A F. C., if very clamant, may form the ground of process by a presbytery, without any specific complaint being brought before them, or there being any particular accuser. In these circumstances, the presbytery act for the vindication of their own order, and in behalf of the morals of the community. Should the inquiries of the presbytery lead them to the conviction that the rumor is not without foundation, they will serve the accused party with a libel, and thus bring him for trial before them. (Hill's *Church Prac.* 49; Cook's *Styles*; and Wood *On Libels*.)

FAMAGOSTA, or **FAMAGUSTA**, is a seaport on the e. coast of Cyprus, on the supposed site of ancient Arsinoë, about 35 m. from Lefkosia (q. v.), the present capital of the island. It was a place of importance in the crusades, and under the Venetians from 1489 to 1571 it became a rich and flourishing city, with a population of fully 30,000 inhabitants, but its population has greatly declined in modern times and in 1891 numbered only 3367, including Varoshia. On coming under the sway of the Turks after a siege of four months, it fell into a state of decay; an earthquake in 1735 completed its ruin. The town is enclosed within well-built walls, constructed from the ruins of Salamis, but is a place of ruins, and almost all the trade is carried on in the new town of Varoshia, built outside the walls. The old church of St. Nicholas is a fine specimen of mediæval architecture; in it Richard I. of England crowned Guy de Lusignan king of Cyprus, in 1191. F. possesses a good natural harbor, about 8,000 ft. long, by 2,000 ft. wide, which would require to be cleansed before it could admit ships of the largest tonnage. The water in the bay exceeds 170 fathoms in depth. Under Turkish rule F. was

Simply regarded as a military fortress and occupied by the sultan's troops; since Cyprus became a British possession, the affairs of the town and province have been administered by a resident civil commissioner and his assistant, with numerous native officials. About 5 m. n. are the ruins of ancient Salamis. Chief exports of F. are corn and pomegranates, for which the district is famous.

FAMILIARS. See INQUISITION.

FAMILIAR SPIRITS, a term employed to denote certain supernatural beings, in attendance upon magicians, wizards, witches, conjurors, and other skillful professors of the black art. The word "familiar" is in all likelihood derived from the Latin *famulus* (a "domestic," a "slave"). The belief in such spirits goes far back into the history of the race. We read of them in the time of Moses, who admonishes his countrymen to "regard not them that have familiar spirits" (Lev. xix. 31), which would imply the prevalence of the superstition among the Egyptians. The word in the original rendered "familiar spirits" is *oboth*; it is of frequent occurrence in the Hebrew Scriptures, and literally signifies "leathern bottles;" thereby indicating the antiquity of the idea that magicians were wont to imprison in bottles the spirits whom their spells had subdued (whence our "bottle-imps and "bottle-conjurors"); the origin, again, of which grotesque belief is perhaps to be sought for in the circumstance that mystical liquids kept in vials have been immensely in vogue among the conjurors of all ages and countries. It is not clear, as some think, that we can include Socrates among those who shared this vulgar superstition, for although he spoke of his attendant "demon" in very ambiguous terms, the opinion of all enlightened critics is, that he meant by the word nothing more and nothing less than what Christians mean by the presence of a divine light and guide in the heart and conscience. But according to Delrio—a great authority on this subject—the belief in familiar spirits in the grosser and more magical form did exist among the ancient Greeks, who, he affirms, designated such beings *paredrii*, "companions," as being ever assiduously at hand. The story of the ring of Gyges, king of Lydia, as narrated by Herodotus, is held by Heywood (see *Hierarchy of the Blessed Angels*, etc.) to prove the existence of the belief in that country also; and it is quite certain that during the middle ages the belief in "enchanted rings" containing familiar spirits was widely diffused throughout Europe, the magicians of Salamanca, Toledo, and those of Italy, being especially famous for their skill in thus subjugating and imprisoning demons. Asia, in fact, would seem to have been the original home of the belief in familiar spirits, which has long been established as a cardinal superstition of the Persians and Hindus, and which appears in perfection in the *Arabian Nights*. The "slave of the lamp" who waits upon Aladdin is an example in point. Whether the belief in familiar spirits sprung up independently among the nations of western Europe, or was transplanted thither by intercourse with the east, does not clearly appear. A favorite form assumed by the familiar spirit was that of a black dog. Jovius and others relate that the famous Cornelius Agrippa (q.v.), half philosopher, half quack, was always accompanied by "a devil in the shape of a black dog;" and add, that when he perceived the approach of death, he took a collar ornamented with nails, disposed in magical inscriptions, from the neck of this animal, and dismissed him with these memorable words: *Abi, perditā bestia, quæ me totum perdidisti*—"Away, accursed beast, who hast ruined me wholly for ever". Butler, in his *Hudibras*, speaks highly of this animal:

Agrippa kept a Stygian pug
 In the garb and habit of a dog
 That was his tutor, and the cur
 Read to the occult philosopher,
 And taught him subtly to maintain
 All other sciences are vain.

The readers of Goethe, too, will remember that Mephistopheles first appears to Faust and Wagner during their evening walk in this shape; but, in truth, the earliest instances of such transmigration are much older, at least if mediæval tradition can be credited, for it assures us that Simon Magus and other ancient magicians had familiar spirits who attended them in the form of dogs. Curiously enough, in spite of the servitude to which the attendant imps were reduced by the potent spells of the magicians, they were popularly supposed, during the middle ages, to have their revenge at last, by carrying with them into eternal torment the souls of their deceased masters. This idea of divine retribution overtaking the practicers of magic is, however, not found out of Christendom. The Jews think not the less but the more of Solomon because he was, as they say, one of the greatest of magicians; and a similar feeling in regard to "wonder-workers" pervades eastern nations generally, though it is to be noticed that the latter are often represented as using their power malignantly. See DEMONS; MAGIC; WITCHCRAFT.

FAMILY (Lat. *familia*). Though we are in the habit of regarding the life of antiquity, and more particularly that of Greece, as less domestic than that of Christian Europe (and probably with reason), the idea of the family or house (Gr. *oikós*), as the nucleus of society, as the political unit, was there very early developed. Aristotle speaks of it as the foundation of the state, and quotes Hesiod to the effect that the original family consisted of the wife and the laboring ox, which held, as he says, to the

poor the position of the slave (*Polit.* i. 1). The complete Greek family then consisted of the man and his wife and his slave; the two latter, Aristotle says, never having been confounded in the same class by the Greeks, as by the barbarians (*Ib.*). In this form, the family was recognized as the model of the monarchy, the earliest, as well as the simplest, form of government. When, by the birth and growth of children, and the death of the father, the original family is broken up into several, the heads of which stand to each other in a co-ordinate rather than a strictly subordinate position, we have in these the prototypes of the more advanced forms of government. Each brother, by becoming the head of a separate family, becomes a member of an aristocracy, or the embodiment of a portion of the sovereign power, as it exists in the separate elements of which a constitutional or a democratic government is composed.

But at Rome the idea of the family was still more closely entwined with that of life in the state, and the natural power of the father was taken as the basis not only of the whole political, but of the whole social, organization of the people. In its more special aspects, the Roman idea of the family will be explained under PATRIA POTESTAS. Here it will be sufficient to state that with the Romans, as with the Greeks, it included the slave as well as the wife, and ultimately the children; a fact which indeed is indicated by the etymology of the word, which belongs to the same root as *famulus*, a slave. In its widest sense, the *familia* included even the inanimate possessions of the citizen, who, as the head of a house, was his own master (*sui juris*); and Gaius (ii. 102) uses it as synonymous with *patrimonium*. In general, however, it was confined to persons—the wife, children, grandchildren, and great-grandchildren, if such there were, and slaves of a full-blown Roman citizen. Sometimes, too, it signified all those who had sprung from a common stock, and would have been members of the family, and under the potestas of a common ancestor, had he been alive. See AGNATE. In this sense, of course, the slaves belonging to the different members of the family were not included in it. It was a family, in short, in the sense in which we speak of “the royal family,” etc., with this difference, that it was possible for an individual to quit it, and to pass into another by adoption. See ADOPTION. Sometimes, again, the word was used with reference to slaves exclusively, and, analogically, to a sect of philosophers, or a body of gladiators. See Smith's *Dictionary of Greek and Roman Antiquities*.

The whole social fabric is based on the grouping of human beings in families; an arrangement which is in harmony with all the conditions and wants of human life, and which tends to foster those habits and affections that are essential to the welfare of mankind. A prosperous community must be an aggregate of happy families; there being little true happiness in the world that is not intimately connected with domestic life. The formal bond of the family is marriage (q.v.); and an essential condition of its right development seems to be a distinct abode, which shall be not a mere shelter, but a house or *home*, affording a certain measure of comfort and decency, according to the standard prevalent in the community. See *Genius and Design of the Domestic Constitution*, by Rev. Christopher Anderson (Edin. 1826).

FAMILY. See ORDER.

FAMILY OF LOVE. See AGAPEMONE.

FAMINE, PORT, an abortive settlement of Spain, on the northern side of the strait of Magellan, is situated in lat. 53° 38' s., and long. 70° 58' west. It owes its name to the death, by starvation, of the Spanish garrison; and it is said to be now a penal colony of the republic of Chili. Some voyagers, however, have spoken of the neighborhood as “covered with flowers,” and “decorated with luxuriance,” and capable of being made, so far as soil is concerned, “one of the finest regions in the world.”

FAMINES have been supposed to furnish a needful check upon inordinate growth of population; and with that view, they have been deemed useful regulators of the universe. A table, recently prepared by Cornelius Walford, read before the statistical society of London in 1878 and 1879, and published under the title, *On the Famines of the World, Past and Present*, enumerates more than 350 famines which have occurred in history. It includes those mentioned in the Bible as afflicting Palestine and the neighboring nations in the time of Abraham (Gen. xii. 10), and of Isaac (Gen. xxvi. 1); the seven years' famine in Egypt; those in ancient Rome; those which have visited the three divisions of Great Britain; those of Europe in the middle ages; the 34 famines of India; and the terrible calamity which has lately ravaged northern China. The table does not claim to be exhaustive. Famines are known to have occurred in China, of which no details have been found; and similar instances have probably existed in Persia and elsewhere in Asia.

The paper teaches that famines have frequently resulted from want of human foresight, or the failure of human expedients. Analysis discloses the following causes of famine which might have been averted or ameliorated:

War.—It draws from their employments those who would be engaged in the cultivation of the soil; it withholds the labor necessary to gather the crops already produced; it often devastates the plains in order to starve out an enemy; it wastes and destroys at every step. At sea, it blockades ports, and diverts cargoes from their destinations; on land, it cuts off armies, cities, districts, from their supplies. Still further, war breeds pestilence; pestilence cuts off many who have escaped from the sword; the land lies

uncultivated; the live stock dies; and desolation follows. Hence the sword, pestilence, and famine are now, as they have been in all time, three associated deadly enemies of the human race.

Defective agriculture may result from ignorance, indifference, or unsuitability of climate, or location. Where the produce of the soil barely meets the current requirements of the inhabitants, it is clear that either the failure of a crop, or a sudden influx of strangers, may produce at least temporary famine. The distress in Ireland in 1879-80 was due in a large degree to the failure of the crops. Potatoes, still the staple food of a large proportion of the population, are set down in the agricultural returns of 1879 at 1,113,676 tons, against 2,526,504 tons in 1878; and of turnips there were but 2,057,804 tons, as compared with 4,686,226 tons of the previous year. The loss in money value to Ireland from this unfavorable harvest was estimated at over \$50,000,000 as compared with 1878. This loss was distributed very evenly over the entire country, but its effect on the usually prosperous counties was only impoverishment, while it reduced to starvation those districts entirely dependent on this precarious article of food.

Deficient transportation was formerly a frequent cause of famines. Because of the bad state of the roads a famine has prevailed in one part of a country when there was a superabundance in another. The construction of canals, and subsequently of railroads, has greatly relieved this difficulty. In India the late famines might have been over come if not averted, but for the want of the means of transport.

Legislative interference has been another cause of famines. It is not contended that in periods of emergency government should not step in and endeavor to mitigate the necessities of the hour; notable examples of such temporary restrictive regulations were shown by the more enlightened nations of antiquity; but it is a great mistake to attempt to regulate commerce to the subversion of the great principles of supply and demand. As an instance, we may cite the corn laws of Great Britain, which were repealed only at the indignant demand or the nation as recently as 1846. There is no doubt that the corn laws often prevented exportation of grain; but they permitted its importation only when prices reached or exceeded certain predetermined limits. The Irish famine of 1845-46 hastened their repeal.

Currency restrictions which tend to debase the value of current money, and thereby to lessen its purchasing power, especially in times of scarcity. The obvious manner in which a debased currency of paper or metal may operate in periods of scarcity is, that its purchasing power in all dealings with other nations is lessened not only in the degree to which it has been debased, but even to a greater extent by the prejudice, or the want of confidence, which its known debasement has inspired. Thus, if a merchant seeks to buy grain abroad, where the coinage value will have to be measured in relation to some coin of the country wherein the purchase is made, or in relation to the standard value of the precious metals in such country, it is certain that the coin tendered will have a purchasing power only in exact relation to its intrinsic character.

Speculating in grain and other food stuffs, known technically as forestalling, engrossing, regrating, etc., has undoubtedly tended to create famines, and in England offenses of this character were prohibited by statute in 1552, but these laws were in their nature arbitrary, and could be tolerated only because they appeared to be made in the interest of the people. Such laws are contrary to all known principles of political economy. Adam Smith and his followers succeeded in proving that no rational argument could be given for upholding them, and were largely instrumental in their final repeal.

Misapplication of grain. Under this head is mainly to be noted the excessive use of grain in brewing and distilling, and by burning, whether willfully or by misadventure; also those wanton acts of waste, such as burning grain-stores, firing ricks, which have too often occurred during periods of scarcity.

Among the natural causes of famines are:

Rain. By excess of rain the soil becomes saturated, and seed decays. In hilly countries the seed is sometimes washed entirely out of the ground, and so is destroyed. This cause of famine is most frequent in tropical countries, where the rains often become torrents. Improved cultivation of the land, with good drainage, is the most effective remedy. Inundations from the sea, from rivers, from inland lakes, fall within this category, and have caused great mischief.

Frost. In temperate regions frost in several forms is destructive to vegetation. In the case of grain cultivation it may, by setting in early, prevent the efficient manipulation of the soil, and the sowing of the autumn seed. Or by being protracted beyond the early months of the year, it will prevent spring sowing, and even seriously injure the young crops. Combined with rain it will frequently destroy the vitality of the seed while yet in the ground. In France and other wine and olive producing countries, the damage occasioned by frost is immense. Such damage, as well as that occasioned by floods, is there a recognized danger against which insurance is purchased.

Drought. In all climates of a tropical character, drought is an important agent in preventing the development of vegetation. With moisture, solar heat develops luxuriant growth; without the moisture there is absolute sterility. The early Bible records refer to the rising of the waters of the Nile as the event upon which the fertility of Egypt depends. About 1060, the overflowing of this great river failed for seven successive years, occasioning one of the greatest famines of history. Two provinces were wholly

depopulated, and in another, half the inhabitants perished. Even in temperate climates long-continued drought is very disastrous.

Earthquakes seem to have but little influence in producing famine, except in the immediate locality of their devastations. Where, however, they have produced irruptions of the sea or inland waters, which has not infrequently been the case, the damage has been extensive.

Hurricanes and storms frequently produce wide-spread injury. They also lead to irruptions of the sea, and to the overflowing of rivers; but as a rule these occur at periods of the year when grain and other crops are not sufficiently advanced to sustain serious damage by shaking or otherwise, or else when they have been harvested.

Hail-storms are usually local in their effects—rarely extending beyond 60 m. in their greatest length, and some 6 m. in width, and generally confined to much smaller limits. They are most prevalent and destructive to grain and fruit in the summer and autumn months. In France hail-storms are frequent and severe. The damage which they occasion has long been insured against in all parts of Europe.

Insects, vermin, etc. Insect plagues appear to have afflicted mankind from a very early period. Thus, flies and locusts were among the plagues of Egypt. The potato-growing regions of the United States and Canada have been seriously afflicted in the last twenty years by the various species of insects known as potato-bugs. The recent famine in North China began in one district by a visitation of locusts. In India such visitations have occurred several times. England has suffered by plagues of insects, especially in 476, and again in 872. But few instances are recorded in which rats, mice, etc., destroyed crops to any serious extent. In 1581, there was a plague in Essex, England, and in 1812-13, a plague of rats in the Madras presidency, which in part occasioned the famine of that year.

FAMINES CELEBRATED IN HISTORY.

B.C.

1708. Egypt; the famine of seven years began.

436. Rome; thousands threw themselves into the Tiber.

A.D.

42. Egypt; awful famine.

262. Rome; attended by plague.

272. Britain; people ate the bark of trees.

306. Scotland; thousands died.

310. England; 40,000 perished.

370. Phrygia; awful famine.

450. Italy; parents ate their children.

739. England, Wales, and Scotland.

823. Again; thousands starved.

954. Again; lasted four years.

1016. Awful famine in all Europe.

1087. England, 21st year of William I.

1193. England and France; produced pestilential fever, until 1195.

1251. England.

1315. England; people ate horses, dogs, cats, and vermin.

1335. England; caused by long rain.

1353. England and France.

1438. England; bread was made from fern roots.

1565. Great Britain.

1693. France; awful famine.

1748. Great Britain; general throughout the realm.

1771. Bengal; devastated the country.

1775. Cape de Verde; 16,000 persons perished.

1789. France; grievously felt.

1795. England; severely felt.

1801. England; throughout the kingdom.

1813. Drontheim; when Sweden intercepted supplies.

1814, 1816, 1822, 1831, 1846. Ireland. The poor suffered greatly because of failure of the potato. In 1847, parliament voted \$50,000,000 to relieve the suffering of the people.

1837-8. North-western India; above 800,000 perished.

1860-1. North-western India; thousands perished.

1865-6. Bengal and Orissa; about 1,000,000 perished.

1868-9. Rajpootana, etc.; about 1,500,000 perished.

1871-2. Persia; very severe.

1874. Bengal; caused by drought.

1874-5. Asia Minor.

1877. Bombay, Madras, Mysore, etc.; about 500,000 perished.

1877-8. Northern China; very severe.

FAN, an instrument or mechanical contrivance for moving the air for the sake of coolness, or for winnowing chaff from grain. In the east, the use of fans is of remote antiquity. The Hebrews, Egyptians, Chinese, and the miscellaneous population of India, all used fans as far back as history reaches. At the present day, it is customary, in the better classes of houses in India, to suspend a large species of F. from the ceiling, and keep it in agitation with strings, pulled by servants, in order to give a degree of coolness to the air. See PUNKAH. Among the oldest notices of winnowing fans are those in the Scriptures. There the F. is always spoken of as an instrument for driving away chaff, or for cleansing in a metaphorical sense; and such notices remind us of the simple processes of husbandry employed by a people little advanced in the arts. It was a long stride from the use of a simple hand-instrument for winnowing to that of the modern mechanism employed for a similar purpose. See FANNERS; BLOWING MACHINES.

As is observable from the collection of Egyptian antiquities in the British museum, the F. as an article of female taste and luxury is of quite as old date as the instrument is for commoner purposes. Terence, a writer of Latin comedies, who lived in the 2d c. B. C., makes one of his characters speak of the F. as used by ladies in ancient Rome: *Cape hoc flabellum, et ventulum huic facito*—"Take this fan, and give her thus a little air." From this Roman origin, the fashion of carrying fans could scarcely fail to be handed down to the ladies of Italy, Spain, and France, whence it was in advanced times imported by the fair of Great Britain. Queen Elizabeth, when in full dress, carried a fan. Shakespeare speaks of fans as connected with a lady's "bravery" or finery:

With scarfs and fans, and double charge of bravery.

It is proper to say, however, that the F. was in these and also in later times not a mere article of finery. There were walking as well as dress fans. The walking or outdoor F. which a lady carried with her to church, or to public promenades, was of large dimensions, sufficient to screen the face from the sun, and answered the purpose of the modern parasol. In old prints, ladies are seen carrying these fans in different attitudes according to fancy. The dress F., which formed part of a lady's equipment at court ceremonies, drums, routs, and theatrical entertainments, was of a size considerably less than the walking F., and altogether more elegant. Of these dress fans there exist numerous specimens bequeathed as heirlooms from one generation to another; indeed, there are few ladies who cannot show several of different eras throughout the 18th c.; some being in good preservation, while in others the gilded stars and cupids which delighted the eyes of great-grandmothers have a mournfully tarnished appearance. In the finer kinds of these old fans, the open part of paper is painted with pretty rural scenes and groups of figures in the style of Watteau (q. v.). All were probably of French manufacture. The more costly F. imported from China was, and still is, altogether of ivory, highly carved and pierced; but it wants the lightness and flexibility which were essential in the ordinary management of this article of the toilet. Strictly speaking, the F. was used less for the purpose of cooling than for giving the hands something to do, and also for symbolically expressing certain passing feelings. In the hand of an adept, the F., by peculiar movements, could be made to express love, disdain, modesty, hope, anger, and other emotions. Gay, speaking of Flavia's accomplishments, says:

In other hands, the fan would prove
An engine of small force in love.

Considering the coarseness of language, even in the higher circles, in the early part of the 18th c., we cannot wonder that the F. should have been indispensable to a lady going into company. It was held up to shield the countenance when anything too shocking for female ears was uttered. Pope has an allusion to this use of the fan:

The modest fan was lifted up no more,
And virgins smiled at what they blushed before.

Steele, in a paper in the *Tatler*, No. 52, Aug. 9, 1709, gives an amusing account of Delamira, a fine lady, resigning her F. when she was about to be married. One of her female acquaintances, having envied the manner in which this charming and fortunate coquette had played her F., asks her for it. Delamira acknowledges the wonderful virtues of the F., and tells her that "all she had above the rest of her sex and contemporary beauties was wholly owing to a F. (that was left her by her mother, and had been long in the family), which, whoever had in possession, and used with skill, should command the hearts of all her beholders; 'and since,' said she smiling, 'I have no more to do with extending my conquests or triumphs, I will make you a present of this inestimable rarity.'" Two years later, Addison, in a paper in the *Spectator* (No. 102), gives a humorous account of the tactics of coquettes in the use of fans: "Women are armed with fans as men with swords, and sometimes do more execution with them;" then he goes on to describe how ladies are instructed to handle, discharge, ground, and flutter their fans—the whole being a pleasant satire on the fan-maneuvering in the reign of queen Anne.

Later in the 18th c., fans served another important purpose. At dancing assemblies in London, Bath, and elsewhere, it was usual for the gentlemen to select their partners

by drawing a fan. All the ladies' fans being placed promiscuously in a hat, each gentleman drew one, and the lady to whom it belonged was his allotted partner. Mrs. Montagu, in one of her letters, refers to this custom: "In the afternoon, I went to lord Oxford's ball at Mary-le-bone. It was very agreeable. The parties were chosen by their fans, but with a little *supercherie*." Of the trick or fraud which this authoress delicately veils under a French term, the beaux of that period were far from guiltless. A lady's F. was almost as well known as her face, and it was not difficult, with a little connivance, to know which to draw. At Edinburgh, where it appears to have been the practice to select a partner for a whole season, the fans of the ladies were carefully studied. Sir Alexander Boswell alludes to this species of stratagem in one of his poems:

Each lady's fan a chosen Damon bore,
With care selected many a day before;
For unprovided with a favorite beau,
The nymph, chagrined, the ball must needs forego.

In Italy, Spain, the West Indies, and also some parts of the United States, fans are largely in use for giving the sensation of coolness during hot weather, and for this purpose they may sometimes be seen in the hands of gentlemen as well as ladies. In Spain, the old fashion of fan-flirting appears to be still in vogue. A late traveler in that country says: "I was vastly interested in the movements of the ladies' fans at church. All the world knows that Spanish fans are in perpetual motion, and betray each feeling, real or assumed, that passes through the mind of the bearer. I felt convinced I could guess the nature of the service at every particular moment by the way in which the fans were waving. The difference between a litany and a thanksgiving was unmistakable; and I believed that minuter shades of devotion were also discoverable."—*Vacation Tourists* (1861).

With other changes in manners, fans are no longer used in English fashionable circles for the frivolous purposes noticed in their past history; they still continue, however, to form an article of ceremonial dress at dinner and other evening parties. In embellishing them, foreign as well as native art is exerted on a scale commensurate with their price. From the superior kinds, composed of ivory and silk, costing 20 guineas, down to those of wood and paper, which are sold at 6d. or 1s., there are varieties to suit every toilet and pocket. Lately, fans made tastefully of feathers, also fans constructed of straw and variously colored ribbons, have been among the novelties of fashion. In the case of a general court mourning, ladies are enjoined to use "black paper fans." The manufacture of fans of various kinds is carried on in England, France, Belgium, Spain, and other European countries, likewise in the United States; and now, as formerly, the F. is an article of export from China. See Uzanne, *Les Ornaments de la Femme* (1892).

FANARIOTS, the general name given to the Greeks inhabiting the Fanar or Fanal in Constantinople, a quarter of the city which takes its name from the beacon (Gr. *phanarion*) situated in it. They first appear in history after the taking of Constantinople by the Turks, and appear to have been originally descendants of such noble Byzantine families as escaped the fury of the barbarians. Afterwards, however, the class was recruited by emigrants from different parts of the old Byzantine empire. Subtle, insinuating, intriguing, they soon took advantage of the ignorance of the Turkish governors, and made themselves politically indispensable to their rulers. They filled the offices of dragomans, secretaries, bankers, etc. One of them, named Panayotaki, at a later period, was appointed dragoman to the divan, and his successors obtained still greater honors. Through their influence, the lucrative office of dragoman of the fleet was called into existence, which gave them almost unlimited power in the islands of the Archipelago. Besides, from them were chosen, until the outbreak of the revolution in 1822, the hospodars of Wallachia and Moldavia, while, in addition, the disposal of most of the civil and military posts under the Turkish government was in their hands. In spite of their power, however, the F. never exhibited much patriotism; they were animated by the petty motives of a caste, and when the war of liberation broke out among their countrymen, they took no part in it. In the present altered state of affairs in Turkey, they have no political influence.

FANCY STOCKS, a term used among American brokers, referring to those stocks which have no fixed value from a regular income, and which vary in price in accordance with the *fancy* of the speculator. Such stocks of course afford great opportunity for stock-gambling.

FANDANGO, like the *bolero*, is an old Spanish national dance, in three-quarter time. It is danced most gracefully in the country, usually to the accompaniment of a guitar, while the dancers beat time with castanets, a custom borrowed from the Moors. It proceeds gradually from a slow and uniform to the liveliest motion; and notwithstanding the simplicity of the *pas*, vividly expresses all the gradations of the passion of love, in a manner sometimes bordering on licentiousness. The people are so passionately fond of it, that the efforts of the clergy have never been able to suppress it.

FANEUIL, PETER, 1700–49: b. N. Y., of French-Huguenot descent; became a merchant in Boston. He was the builder of Faneuil Hall, the pride of old Boston, given to that city by him as a personal donation.

FANEUIL HALL, a spacious public hall in Boston, Mass., erected in 1742 by Peter Faneuil, and presented by him to the town. In its original condition as so gifted, the building contained a hall for public meetings, with lesser apartments above, and a basement used as a market. In 1761, it was destroyed by fire, and rebuilt. During the revolutionary struggle with England, the hall was so often used for important political meetings, that it became known as "the cradle of American liberty." In 1805, the building was increased in height by an additional story, and also increased in width. It is now an edifice about 80 ft. square; the hall contains some fine paintings; and the basement is still used as a market.

FANFARE is the French name of a short and lively military air or call, executed on brass instruments. It was brought by the Arabs into Spain, whence it passed into Mexico and the new world. *Fanfaron*, derived from *F.*, is the name given to a swaggering bully or cowardly boaster, probably because of the empty noise he makes when "blowing his own trumpet," or threatening timid people, and the term applied to his idle braggadocia and vaporing vaunts is *fanfaronnade*.

FANG (A.-S. a catching or grasp, from *fon*, to seize; pp. *fangen*; comp. Ger. *fangen*, to catch). In the terminology of the law of Scotland, a thief taken *with the fang* is one apprehended while carrying the stolen goods on his person. It is not very long since this word formed part of the common speech of Scotland:

"Snap went the shears, then in a wink,
The fang was stowed behind a bink."

Morison's Poems, p. 110.

In England, also, the verb *fang* was still in use in Shakespeare's time: "Destruction fang mankind!" (*Timon of Athens*, iv. 3); and "Master Fang," in *Henry IV.*, is named after his office. We still use the phrase "in the fangs," for in the clutches; and the fangs of a dog or of a serpent are its teeth with which it catches or holds.

FANNERS, a machine employed to winnow grain. In passing through the machine, the grain is rapidly agitated in a sieve, and falling through a strong current of wind, created by a rotatory fan, the chaff is blown out at one end, and the cleansed particles fall out at an orifice beneath. The apparatus is composed chiefly of wood, and though ordinarily moved by the hand, it is sometimes connected with the driving power of a thrashing-mill. The *F.* superseded the old and slow process of winnowing, which consisted in throwing up the grain by means of sieves or shovels, while a current of wind, blowing across the thrashing-floor, carried away the chaff. "A machine for the winnowing of corn was, as far as can be ascertained, for the first time made in this island by Andrew Rodger, a farmer on the estate of Cavers in Roxburghshire, in the year 1737. It was after retiring from his farm to indulge a bent for mechanics, that he entered on this remarkable invention, and began circulating what were called *fanners* throughout the country, which his descendants continued to do for many years."—*Domestic Annals of Scotland*, by R. Chambers, vol. iii. Strangely enough, there was a strong opposition to the use of this useful instrument; the objectors being certain rigid sectaries in Scotland, who saw in it an impious evasion of the division will. To create an artificial wind, was a distinct flying in the face of the text, "He that formeth the mountains, and createth the wind."—Amos iv. 13. Apart from the folly of the objectors, who carried their fancies to the extent of petty persecution, we are amazed at their apparent neglect of the fact, that the winnowing of corn by artificial means, in which fans performed a conspicuous part, is mentioned repeatedly in the Old Testament. See **FAN**. The advantages in using the *F.* soon overcame all prejudices on the subject, and the objections to the use of the machine are now remembered only by tradition, and by a passage in one of the imperishable fictions of Scott. In the tale of *Old Mortality*, Mause Headrigg is made anachronously to speak to her mistress about "a newfangled machine for *dighing* the corn frae the chaff, thus impiously thwarting the will o' Divine Providence, by raising wind for your leddyship's use by human art, instead of soliciting it by prayer, or patiently waiting for whatever dispensation of wind Providence was pleased to send upon the shieling-hill."

FANNIÉRE, FRANÇOIS AUGUSTE, and FRANÇOIS JOSEPH, b., the first in 1818, and the other in 1822; French engravers of especial eminence. Their masterpieces are two shields representing incidents from *Orlando Furioso*. Auguste is a member of the legion of honor.

FANNIN, a co. in n. Georgia, on the Tennessee and North Carolina borders; 465 sq.m.; pop. 90, 8724, inclu. colored. It has a mountainous surface, and much of it is yet uncultivated. Co. seat, Morganton.

FANNIN, a co. in n.e. Texas on Red river, crossed by the Texas and Pacific railroad; 891 sq.m.; pop. '90, 38,709, inclu. colored. The surface is undulating, the soil fertile, and timber abundant. Co. seat, Bonham.

FANNIN, JAMES W., b. N. C., killed at Goliad, Texas, 1836. Being defeated by a superior force of Mexicans, Fannin and 356 others surrendered as prisoners of war, with the stipulation that they should be treated according to the ordinary rules. Instead of

carrying out the agreement Santa Anna ordered them to be shot, Fanning being the last victim.

FANNING, DAVID, 1754-1825; b. N. C. Having been robbed at the beginning of the revolution, by men who claimed to be whigs, Fanning became a tory, and committed many daring outrages, killing several men who had incurred his enmity. In one case he rushed into a village where a court was in session, and carried off the judge, lawyers, and spectators. Not long afterwards he captured Gov. Burke and his entire suite. When the patriots gained rule he fled to Florida, and from there to St. John, N. B. Here he was a member of the colonial assembly; but his character was developed in many villainies, culminating finally in sentence to death for rape; but he escaped from prison, and was afterwards pardoned.

FANNING, EDMUND, LL.D., 1737-1818; b. Long Island; a graduate of Yale. He was a tory in the revolution, and raised and commanded a regiment in the king's service. After the war he was rewarded with the offices of councilor and lieutenant-governor of Nova Scotia, and governor of Prince Edward's island. He rose to maj.gen. in the British army.

FANO (Lat. *Fanum Fortunæ*, so called from the temple of Fortune, which the Romans erected here in commemoration of the defeat of Asdrubal on the Metaurus) is the name of a town and seaport of Italy, in the province of Urbino e Pesaro, finely situated in a beautiful and fertile district, on the shore of the Adriatic, 30 m. n.w. of Ancona, and near the mouth of the Metaurus. It is well built, is surrounded with walls and ditches, has a cathedral dedicated to St. Fortunato, and numerous churches, containing many valuable paintings, among which are several of the best works of Domenichino, and an excellent "Annunciation" by Guido. The remains of a triumphal arch of white marble, raised in honor of Augustus, form perhaps the chief object of classical interest at Fano. Pop. 6,500, who carry on considerable trade in corn and oil, and in silk goods. Here, in 1514, pope Julius II. established the first printing-press with Arabic letters known in Europe. The port of F. was once well known to the traders of the Adriatic.

FAN PALM, a name common to all those palms which have fan-shaped leaves, as the species of *mauritia*, *lodoicea* (double cocoa-nut), *hyphæne* (Doum palm), *corypha*, *livistona*, *chamærops*, etc. The only truly European palm, *chamærops humilis* (q.v.), is a F. P., as is also the North American palmetto. The talipot palm (*corypha umbraculifera*) is sometimes called the great fan palm. The Palmyra palm is another fan palm. The fan-shaped leaf is produced by an abbreviation of the midrib of a pinnated leaf. See *illus., PALMS, ETC., vol. XI.*

FANSHAWE, Sir RICHARD, was b. in 1608, at Ware Park, in the co. of Hertford; studied at Jesus college, Cambridge; and in 1626, became a member of the inner temple. On the outbreak of the civil war, he took part with the king; and in 1648, became treasurer to the navy under prince Rupert. He was taken prisoner at the battle of Worcester; and on his release, withdrew to Breda in Holland, where Charles II. was holding his court in exile. After the restoration, he was appointed ambassador at the court of Madrid, where he died, in 1666. F. was an author of considerable reputation. His most celebrated work, now very rare, is a translation of Guarini's *Pastor Fido*, the lyrical passages of which are rendered with remarkable skill and elegance. The volume in which it appeared was published in 1664, and contains other pieces in prose and verse.

FAN-TAN, a gambling game very popular among the Chinese, and other Orientals. Bronze or copper coins are used, concealed by a bowl, and the betting is made on what the remainder will be, after dividing the pile of coins by 4. See *The Gambling Games of the Chinese in America*, by Culin (1891).

FANTA'SIA, in music, the name of a composition of a similar character to the capriccio; also given to extempore effusions performed by a musician who possesses the rare gift of producing, as it were, off-hand music like a well-studied, regular composition. Hummel was more celebrated for his extempore fantasias on the pianoforte than even for his published compositions. Frederick Schneider was equally great for his free fantasias on the organ,

FANTEE, a section of the gold coast of Africa, lying along the gulf of Guinea, now under British protection. The country is well watered, fertile, and populous; the inhabitants belonging to the same family as the Ashantees, but more muscular, remarkably cleanly, and distinguished from other African tribes by small scarifications on the cheeks and back of the neck. They are separated from the Ashantees by a belt of almost untraversed forests, and declaring their independence, controlled about 100 m. of the coast. During a war with the Ashantees in 1807, they secured the aid of the English, but nevertheless were overrun by their enemies. They rebelled, with English help, in 1823, but were again subdued, and the British commander, sir Charles McCarthy, was captured and killed; but in 1823, the Ashantees were driven out of the Fantee territory, and until 1872 the Fantees were unmolesed. In that year, the Ashantees complained of the treaty transferring the Dutch coast colonies to the English, and in 1873, the Ashantee king overran the Fantee country, and even threatened Cape Coast castle with a native force of 50,000. He was driven back, however, by sir Garnet Wolseley, in 1874. See *ASHANTEE*.

FANTOCCINI. See PUPPET.

FAN-TRACERY VAULTING, a kind of late Gothic vaulting (15th c.), so called from its resemblance to a fan. The ribs or veins spring from one point, the cap of the shaft, and radiate with the same curvature, and at equal intervals, round the surface of a curved cone or polygon, till they reach the semicircular or polygonal ribs which divide the roof horizontally at the ridge level. The spaces between the ribs are filled with foils and cusps, resembling the tracery of a Gothic window; hence the name *fan-tracery*. The spaces between the outlines of the fans at the ridge level, are called by Prof. Whewell (*German Churches*) ridge lozenges. In Henry VII.'s chapel, Westminster, one of the best examples of this kind of vaulting, these lozenges are occupied by pendants, which produce a most astonishing effect, looking like arches resting on nothing. They are, however, supported with great ingenuity by internal arches, rising high above the visible vaulting. This is one of the *tours-de-force* which astonish the vulgar, but are only adopted when art has reached a low level, and has in a great measure given place to artifice. Fan-tracery is a very beautiful kind of vaulting, and is peculiar to England, where it originated, and where alone it was practiced. Among the finest examples are Henry VII.'s chapel at Westminster; St. George's, Windsor; and king's college chapel, Cambridge. Fan-tracery is also frequently used in the vaulting of cloisters, as at Canterbury, Chester, etc.

FARAD, the unit of capacity for holding electricity; so named in honor of Faraday. See ELECTRICITY.

FARADAY, MICHAEL, D.C.L., d. 1867, one of the most distinguished chemists and natural philosophers of the present century; a splendid instance of success obtained by patience, perseverance, and genius, over obstacles of birth, education, and fortune. He was born in 1791, near London, his father being a blacksmith. He was early apprenticed to a bookbinder; yet even then he devoted his leisure time to science, and amongst other things, made experiments with an electrical machine of his own construction. Chance having procured him admission, in 1812, to the chemical lectures of sir H. Davy (q.v.), then in the zenith of his fame, he ventured to send to Davy the notes he had taken, with a modest expression of his desire to be employed in some intellectual pursuit. Davy seems to have at first endeavored to discourage him, but finding him thoroughly in earnest, soon engaged him as his assistant at the royal institution. He traveled with Davy to the continent, as assistant and amanuensis. On their return to London, Davy confided to him the performance of certain experiments, which led in his hands to the condensation of gases into liquids by pressure. Here he first showed some of that extraordinary power and fertility which have rendered his name familiar to every one even slightly acquainted with physics, and which led to his appointment, in 1827, to sir H. Davy's post of professor of chemistry in the royal institution. We shall give a brief summary of his more important discoveries and published works, arranging the different subjects according to their position in various branches of science, rather than in their chronological order.

In chemistry, we have his treatise on *Chemical Manipulation*, 1827; 2d ed. 1842, even now a very valuable book of reference. His *Lectures on the Non-metallic Elements*, and *Lectures on the Chemical History of a Candle*, delivered at the royal institution in 1860, were published shortly after. As discoveries or investigations of a high order in this branch of science, we may mention—new compounds of chlorine and carbon, 1821; alloys of steel, 1822; compounds of hydrogen and carbon, 1825; action of sulphuric acid on naphthaline, 1826; decomposition of hydrocarbons by expansion, 1827; and the very valuable series of experiments made in 1829-30, on the manufacture of glass for optical purposes, which resulted in one of his greatest discoveries.

As practical applications of science, his preparation of the lungs for diving, and ventilation of light-house lamps, are conspicuous, as are also his celebrated letter on table-turning, and his lecture on mental education.

To enumerate only the most prominent of his publications on physical science, we may commence with the Condensation of the Gases (already referred to); then we have Limits of Vaporization, Optical Deceptions, Acoustical Figures, Regelation, Relation of Gold and other Metals to Light, and Conservation of Force. Of these, the condensation of gases into liquids and solids, though previously effected by others (and F. has ever been the foremost to acknowledge another's priority), he has really made his own, not only by the extent and accuracy of his experiments, but by the exquisite experimental methods by which he effected the results. His ideas on regelation, and its connection with the motion of glaciers, have not met with universal acceptance, though (see HEAT, ICE, GLACIER) there is no dispute as to his being correct in his *facts*. In regard to conservation of force, there can be no doubt that he has been led into a fallacy, by mistaking the technical use of the word *force* (see FORCE), for in his article on the subject he describes experiments made with the view of proving the conservation of *statical*, not *dynamical* force, whereas the doctrine of conservation asserts merely the conservation of "energy," which is *not* statical force. He may be right also, but if so, it will be by a new discovery, having no connection whatever with "conservation of energy."

His Christmas lectures at the royal institution, though professedly addressed to the

young, contain in reality much that may well be pondered by the old. His manner, his unvarying success in illustration, and his felicitous choice of expression, though the subjects were often of the most abstruse nature, were such as to charm and attract all classes of hearers. Besides two sets (already mentioned) on chemical subjects, we have his *Lectures on the Physical Forces*, a simple work, but in reality most profound, even in its slightest remarks.

But the great work of his life is the series of *Experimental Researches on Electricity*, published in the *Philosophical Transactions* during the last forty years and more. Fully to understand all the discoveries contained in that extraordinary set of papers, would require a knowledge of all that has been discovered during that time as to electricity, magnetism, electro-magnetism, and diamagnetism. We may merely mention the following, almost all of which are discoveries of the first order. They are given in the order of publication, which is nearly that of discovery: 1. Induced Electricity, 1831, comprehending and explaining a vast variety of phenomena, some of which have already been applied in practice (especially as magneto-electricity) to light-houses, electro-plating, firing of mines, telegraphy, and medical purposes. Electric currents derived from the earth's magnetism. 2. The Electro-ionic State of Matter, 1831; 3. Identity of Electricity from Different Sources, 1833; 4. Equivalents in Electro-chemical Decomposition, 1834; 5. Electro-static Induction—Specific Inductive Capacity, 1838; 6. Relation of Electric and Magnetic Forces, 1838; 7. The Electricity of the Gymnotus, 1839; 8. Hydro-electricity, 1843; 9. Magnetic Rotatory Polarization, 1846; 10. Diamagnetism and the Magnetic Condition of all Matter, 1846; 11. Polarity of Diamagnetics, and the Relation of Diamagnetism to Crystalline Forces, 1849; 12. Relation of Gravity to Electricity, 1851. This, as before remarked, is F.'s attempt to prove a conservation of statical force. 13. Atmospheric Magnetism, 1851. An attempt to explain the diurnal changes of the earth's magnetic force by the solar effect on the oxygen of the air; a very interesting paper.

Faraday, who had received a pension in 1835, was in 1858 given a house in Hampton Court. In 1862 he gave his last discourse on "gas-furnaces;" and advocated the use of magneto-electric light in light-houses. In 1865, he resigned the position of adviser to the Trinity house, also that of director of the laboratory of the royal institution. See *Life of Faraday*, by Tyndall (1869); and by Bence Jones (2 vols. 1870).

FARADIZATION. See ELECTRICITY, MEDICAL.

FARALLO'NE ISLANDS, a group of small islands off the coast of California, the nearest one 32 m. w. of the entrance to San Francisco bay. They lie parallel with the coast, and their extreme points are about 12 m. apart. On the s. Farallone is an important light-house. These islands are the resort of myriads of sea-fowl, gulls, and murre, whence eggs are carried, in great quantities, to the San Francisco market by a company which owns the islands.

FARCE, a dramatic piece of a low comic character. The difference between it and comedy proper is one of degree, and not of kind. The aim of both is to excite mirth; but while the former does so by a comparatively faithful adherence to nature and truth, the latter assumes to itself a much greater license, and does not scruple to make use of any extravagance or improbability that may serve its purpose. It does not, therefore, exhibit, in general, a refined wit or humor, but contents itself with grotesque rencontres, and dialogues provocative of fun and jollity. The name is differently explained. In any case, it comes originally from the Latin *farciare*, to stuff; but while Adelung says that, in the middle ages, *farce* signified in Germany certain songs, which were sung between the prayers during divine service, others derive it from the Italian *farsa*, this from the Latin *farsum* (stuffed); while Paolo Bernardi states that it comes from a Provençal word *farsum*, meaning a *ragout*, or mess of different ingredients, an opinion which has this to say for itself, that the *dramatis personæ*, *Jack-pudding*, etc., were generally named after special dishes or mixtures. The first farces are said to have been composed by the society of the *Clercs de Bazoche* in Paris, about the year 1400, as a contrast to the ecclesiastical plays performed by the religious orders. The most widely celebrated and the oldest is the *Farce de Maître Pierre Pathelin*, which some consider to be a composition of the 13th c., but which was more probably executed by one Peter Blanchet, about 1480. Subsequently, Molière elevated and refined the farce into pure comedy, in his *Médecin Malgré lui*, *Malade Imaginaire*, *Les Fourberies de Scapin*, and other inimitable productions. In England, the origin of the modern F. dates from about the commencement of the 18th century. It then began to be regarded as something distinct from comedy proper, and to constitute a special theatrical entertainment. Of all the numerous farces which have been performed before English audiences, only those of Samuel Foote have kept a place in literature.

FARCY in horses depends upon the same causes as glanders (q. v.), which it usually precedes and accompanies. The absorbent glands and vessels, usually of one or both hind-limbs, are inflamed, tender, swollen, hard, and knotted. The vitiated lymph thus poured out softens, and ulcers or F. buds appear. Unlike the ulcers of glanders, they are curable, but require time and care. They must be scarified with the hot iron, which, to prevent their spreading, may also be gently run over the adjacent sound skin. Good

feeding and comfortable lodgings are essential, and if they do not interfere with the appetite, give tonics, such as a dram each of sulphate of copper and iodine, repeated twice a day.

FADEL-BOUND, a disease of cattle and sheep, consists of impaction of the fardel bag, or third stomach, with food, which is taken in between the leaves of this globular stomach, there to be fully softened and reduced. When the food is unusually tough, dry, or indigestible, consisting, for example, of overripe clover, vetches, or rye-grass, the stomach cannot moisten and reduce it with sufficient rapidity; fresh quantities continue to be taken up, until the overgorged organ becomes paralyzed, its secretions dried up, and its leaves affected with chronic inflammation. The slighter cases so common amongst stall-fed cattle are "loss of cud," indigestion, and torpidity of the bowels. In severer form there is also fever, grunting, swelling up of the first stomach, and sometimes stupor or epilepsy. The overgorged stomach can, moreover, be felt by pressing the closed fist upwards and backwards underneath the false ribs on the right side. The symptoms often extend over ten days or a fortnight. Purgatives and stimulants are to be given.

FAREHAM, a market-t. and sea-bathing place in the s. of Hampshire, on a creek at the n.w. end of Portsmouth harbor, 5 m. n.n.w. of Portsmouth. It has shipbuilding, brick-making, and manufactures of earthenware. Pop. '91, 7934.

FAREL, GUILLAUME, one of the most active promoters of the reformation in Switzerland, was b. in the year 1489 in Dauphiné. He studied at Paris, and was at first distinguished by his extravagant zeal for the practices of the Catholic church. "Truly," says he in one of his letters, "the papacy itself was not so papistical as my heart." Intercourse with the Waldenses, and with his friend Lefevre d'Etaples, induced him to study the Scriptures; the result was his conversion to Protestantism, and F., who was by nature vehement even to indiscretion, immediately commenced to proselytize. The chief scene of his labors was France and Switzerland. At Basel, 15th Feb., 1524, he opened his career of controversy and evangelization by publicly sustaining 30 theses on the points in dispute between Roman Catholicism and Protestantism. In less than two months, he was compelled to leave, mainly on account of a quarrel between himself and Erasmus, whom, on account of his moderate or trimming policy, F. had compared to Balaam. F. next went to Strasburg, and afterwards to Montbéliard, where his iconoclastic way of preaching the gospel excited the alarm of his friends, several of whom, Ecolampadius among others, censured him sharply for his violence. His zeal was next manifested in the canton of Bern. It was also chiefly through his exertions that the towns of Aigle, Bex, Olon, Morat, and Neuchâtel followed the example of Bern in embracing the reformation. In 1532, he went to Geneva, where his success was at first so great, that on account of the agitation excited, he had to leave the city. He returned in 1533, was again compelled to withdraw, but once more entered it in 1534. This was his year of triumph; the reformers filled the churches, and the Catholic clergy, who had made themselves odious to the citizens by abetting the despotic schemes of the duke of Savoy, retired to Lausanne and Fribourg. In Aug., 1535, the town council of Geneva formally proclaimed the reformation. F., however, was a missionary, not a legislator, and the organization of the Genevan church passed into the hands of Calvin (q.v.). The severity of the new ecclesiastical discipline produced a reaction, and in April, 1538, the two reformers were expelled from the city. F. took up his residence at Neuchâtel, where the reformed church was in a state of deplorable disorder. He composed its differences, and drew up a constitution, which it accepted, after long and stormy debates, in 1542. In Sept. of the same year, we find him fighting the battle of the reformation at Metz. After his return to Neuchâtel, he frequently visited Calvin, whose authority in Geneva had been completely restored. It was on one of these occasions that he was present at the burning of Servetus, and though not, comparatively speaking, a bigoted Calvinist, he allowed his orthodoxy on that occasion to choke his humanity, exclaiming, as the unhappy heretic uttered his last prayer to God from the flames: "See what power the devil has over one who has fallen into his hands." In 1557, along with Beza, he was sent to the Protestant princes of Germany, to implore their aid for the Waldenses, and on his return—inexhaustible in his activity—he sought a new sphere of evangelistic labor in the regions of the Jura mountains. When trembling upon threescore-and-ten, he married a young wife, very much to Calvin's disgust, who sarcastically speaks of him under the circumstances as "our poor brother." But neither his newly formed domestic ties, nor the infirmities of age, could quench his missionary zeal. In 1560-61, he proceeded to his native Dauphiné, and passed several months at Gap, preaching against Catholicism with all the ardor of his youth. In Nov., 1561, he was thrown into prison, but was shortly after rescued by his friends. In 1564, he paid a visit to the dying Calvin; his strength, however, was now nearly exhausted, and on the 13th Sept., 1565, he expired at Neuchâtel, leaving a son named Jean, who survived him only three years. F. was a man of extensive scholarship, and wrote largely, but his works very inadequately represent the genius of the man. Compare Kirchhofer's *Das Leben Wilhelm Farel's* (2 vols., Zurich, 1831-33) and C. Schmidt's *Etudes sur Farel* (Strasburg, 1834); also his *Wilhelm F. und Peter Viret*.

FAREWELL, CAPE, the southern extremity of Greenland, lies in lat. 59° 49' n., and long. 43° 54' west. It is generally beset with ice, which, according to recent authorities,

appears to come from the n.e., and to sweep round into Davis strait. Hence it is but little known; and, in fact, the Danish traders, in passing to and from the settlements on West Greenland, seem uniformly to maintain an offing of more than 100 miles.

FARGO, city and co. seat of Cass co., N. D., on the western bank of the Red river of the North, opposite Moorhead, Minn., and at the head of navigation; an important wheat market and a place of rapid but substantial growth. It is entered by the Northern Pacific, Great Northern, and the Chicago, Milwaukee and St. Paul railroads. The city contains the county court-house and jail; U. S. land office; Fargo college (Congregational); the State Agricultural and Mechanical college, with a large creamery; Y. M. C. A. building; opera house; theatre; high and graded public and parochial schools; convent of Presentation nuns; St. Mary's academy; business college; churches of the leading denominations; and several banks and newspapers. There are gas and electric light plants, electric street railroads, Holly system of water-works, and improved sewerage system. Among industrial interests are the car shops of the Northern Pacific railroad, several large grain elevators, flour, paper, and planing mills, brewery and extensive brick yards. The city suffered severely by a fire in 1893. Pop. '90, 5664.

FARGUS, FREDERICK JOHN, better known by his pen-name, "Hugh Conway," an English author, who was born in Bristol, in 1847, and died in Monte Carlo, Italy, in 1885. He was an auctioneer by trade and did not acquire reputation as an author until 1884, when he published *Called Back*, a novel which became very popular both in Europe and America, and was dramatized. Among other works preceding or following this, may be mentioned *Dark Days*, *Slings and Arrows*, and *Bound Together*.

FARIA Y SOUSA, MANOEL, a Portuguese historian and poet, was b. of an ancient family at Caravella, in the province of Entre Minho e Douro, 18th Mar., 1590, and studied at the university of Braga. For some time he was in the service of the bishop of Oporto, but shortly after 1613 he went to Madrid, where, however, he did not long remain, as he found no opportunity there of improving his circumstances. In 1631, he obtained the office of secretary to the Spanish embassy at Rome, where his extensive acquirements procured him the notice of Pope Urban VIII. and of all the learned men of the city. After some time, he returned to Spain, and died at Madrid 3d June, 1649. Faria's writings are partly in Spanish, and partly in Portuguese. Of the former, we may mention *Discursos morales y politicos* (2 vols., Madr. 1623-26), *Epitome de las Historias Portuguesas* (Madr. 1628), *Comentarios sobre la Lusitana* (2 vols., Madr. 1639), *Asia Portuguesa* (3 vols., Lisbon, 1666-75), *Europa Portuguesa* (3 vols., Lisbon, 1678-80), *Africa Portuguesa* (Lisbon, 1681), and the greater portion of his poems, which he collected under the title of *Fuente de Aganippe o Rimas Varias* (Madr. 1644-46). These poems consist of sonnets, eclogues, canzones, and madrigals. Faria, however, composed about 200 sonnets and 12 eclogues in the Portuguese language; and it is mainly by these, and also by three theoretical treatises on poetry, that he has influenced the development of the poetic literature of Portugal, in which he was long regarded as an oracle. His poetry exhibits talent and spirit, but is on the whole tasteless and bombastic. Faria is not to be confounded with another Portuguese author of the same name, who was born at Lisbon in 1581, and died at Evora in 1655, and who was one of the most learned numismatists of his age.

FARIBAULT, a co. in s. Minnesota, on the Iowa border, traversed by Mankato River; 730 sq. m.; pop. '90, 16,708. Co. seat, Blue Earth City.

FARIBAULT, city and co. seat of Rice co., Minn., at the confluence of the Straight and Cannon rivers, 53 miles south of St. Paul. It is situated on the Chicago, Milwaukee and St. Paul, and the Minneapolis and St. Louis railroads. The city contains a fine court house, city hall, many churches, a public library, national banks, and weekly and monthly periodicals. There are two parks, and the city is well supplied with water, gas, and electric lights. Faribault is best known as an educational center, as it contains the State schools for the deaf, blind, and imbecile; the Seabury Divinity school; the Shattuck military school; St. Mary's school for girls; Bethlehem academy for girls; a convent; and a business college. The "Faribault Plan" of public education was introduced here in 1891, and consists of a compromise between the Roman Catholic and the public school system, by which the parochial school property was surrendered to the city, which assumed the expense of carrying on the schools, the sisters being retained as teachers, under the supervision of the board of education. Religious instruction, if desired, is given after school hours, but is eliminated from the general course. The city contains a number of manufactories, consisting of flour, planing, and woolen mills, breweries, furniture, carriage, canning, piano, and rattan factories, and foundries and boiler works. Pop. '90, 6520.

FARINA is the term used by many writers on bees, instead of *pollen*, to denote the pollen of flowers collected by bees for feeding their larvæ. See **BEE**.

FARINA, a Latin term for meal or flour, which is also frequently extended to many substances which agree with the meal of the corn-plants or cerealia (q. v.) in containing much starch, and food made of such substances is often called *farinaceous*. Cassava meal is often called *F. (farinha)* in many parts of South America.

Fossil farina, mountain milk, or *agaric mineral* is a deposit of silicified animalcules.

obtained from China, etc. In 100 parts, it consists of silica 50½, alumina 26½, magnesia 9, water and organic matter 13, with traces of lime and oxide of iron.

FARINA, JOHANN MARIA (1685-1766), has the reputation of inventing the celebrated perfume, eau de cologne (q.v.), although this is disputed by others, bearing the name of Farina, who manufacture a similar article in the city of Cologne.

FARINELLI (real name Carlo Broschi), 1705-82; b. Naples; a remarkable soprano singer, whose voice was of unequalled compass, possessing seven or eight notes more than those of ordinary vocalists. His career was one of unbroken triumph. In Spain his voice was used by the queen to cure Philip V. of his melancholy mania, and he acquired such influence over the king as to be in power, if not in name, the real prime minister. Night after night he sang to Philip the same six songs, never varying the programme. Through his influence the Italian opera was established in Madrid.

FARINI, CARLO LUIGI, an Italian author and statesman, was b. in 1812, at Russi, in Ravenna, in the n. of Italy. Having, with great success, studied medicine at Bologna, F. first became known by several publications belonging to the science of medicine, and soon afterwards by contributions to various scientific periodicals. In 1841 and 1842, having mixed himself up with politics, he was obliged to leave the Roman states, and change his residence repeatedly, until he finally settled at Turin. The amnesty following shortly upon the accession of Pio Nono, opened to F. not only his native country, but also a new career, through the liberal system inaugurated by the supreme pontiff. In 1847, he was called into the reformed ministry, as a substitute to the home secretary; in 1848, he was present in the suite of Carlo Alberto at Volta, and after the flight of the king, protested against the proclaiming of a republic. During the short ministry of the unfortunate Rossi (q.v.), F. was director-gen. of the sanitary and prison department at Rome, from which post, however, he retired as soon as the reaction under Antonelli began to be established. Upon the occupation of Rome by the French, F. became once more an exile, but for a short time only, for in Piedmont he found a home as well as public honors. In 1850, he held the seat of minister of public instruction in the cabinet of Victor Emmanuel II., and on retiring from office, was named a member of the supreme council. When Central Italy resolved to annex itself to the kingdom of Victor Emmanuel, by means of universal suffrage, it was F. who directed the popular mind with such admirable success that, on the day of ballot, not one vote was delivered asking for a separate kingdom. As governor of Central Italy, he showed an undaunted courage against the threats of Austria, and exhibited a thoroughly consistent moderation against the unruly promptings of the Mazzinians. The same qualities accompanied his measures when the newly acquired kingdom of Naples was to be reorganized. In 1861, F. became minister of commerce and public works. In 1862, he took office as president of the cabinet, which he resigned in 1863. He died in 1866. It has been said that "Farini was the mind of Italy, as Garibaldi was its sword." Among his literary productions may be mentioned, *Il Stato Romano* (The Roman State), translated into English under the superintendence of the right Hon. W. E. Gladstone (London, 4 vols., 1859); *Storia d'Italia* (History of Italy), a continuation of Botta's celebrated work. F. was also a contributor to count Cavour's *Risorgimento*.

FARIS EL-SHIDIAK, an Arab poet and *littérateur*, was b. about the year 1796. He studied at Cairo, under the ulemas of the mosque of El-Azhar, and in 1836 procured for M. Fresnel some very valuable commentaries upon the poem of *Shanfara*. The dedication of a poem to the bey of Tunis, about 1847, induced that monarch to send a war-vessel to Malta, for the purpose of bringing F. to Tunis, where the poet obtained a distinguished reception, and many rich presents. In 1851 he published in London the New Testament in Arabic. He subsequently resided in France for a considerable time, and published there, along with M. G. Dugat, in 1854, a French grammar in his native tongue for the use of the Kabyles of Algeria. His principal work is entitled *La Vie et les Aventures de Fariak* (Paris, 1855); it contains a narrative of his own travels, with critical observations on the Arabs and other peoples whom he visited. Some of his own poems are also interspersed. F. returned to London the year before the publication of this work. On the outbreak of the Crimean war, the sultan appointed him one of his dragomans or interpreters, but he never discharged the duties of his office. F. was said to possess in manuscript a collection of poems, called *The Divan*.

FARLOW, WILLIAM GILSON, M.D., botanist, b. Boston, Dec. 17, 1844; graduated at Harvard college, 1866, and at its medical school, 1870; was assistant professor of botany at Harvard, 1874-79; became professor of cryptogamic botany there, 1879. He attained high rank in his special field and published numerous works thereon, and became a member of the National academy of sciences and of other American and European societies.

FARM. See AGRICULTURE.

FARMER, HUGH, 1714-87; an English theologian, a pupil of Doctor Doddridge. Among his works are *An Inquiry into the Nature and Design of our Lord's Temptation in the Wilderness*; *Dissertation on Miracles, designed to show that they are Arguments of a Divine Interposition, and Absolute Proofs of the Mission and Doctrine of a Prophet*; and *The General Prevalence of the Worship of Human Spirits in the Ancient Heathen Nations Asserted and Proved*.

FARMER, JOHN, 1789—1838; b. Mass.; especially devoted to genealogy. In 1829 he published a *Genealogical Register* which it was thought contained the names of nearly all the first European settlers in New England. A new edition with many additions was issued in 1862. He edited Belknap's *History of New Hampshire*, to which he added many valuable notes.

FARMER, RICHARD, D.D., a well-known scholar of the last century, was b. at Leicester, Aug. 28, 1735, and was entered a pensioner of Emmanuel college, Cambridge, in 1753. In 1760, he took his degree of M.A., and was appointed classical tutor of his own college. It is not known when he took orders, but, while he held the office of tutor, he acted as curate at Swavesey, a village 8 m. from Cambridge. In 1766, he published his once famous *Essay on the Learning of Shakespeare* (reprinted in 1789 and in 1821), the purpose of which was to show the sources whence the great dramatist derived his knowledge of the ancients. F. proved that it was from translations, and that Shakespeare has often cited the phraseology, and even the errors, of the translators. In 1775, he was elected to the mastership of Emmanuel college, and in 1778, chief-librarian of the university. In 1780, he obtained a prebendal stall at Lichfield, but in 1788, resigned it for the office of canon residentiary of St. Paul's. He died Sept. 8, 1797.

FARMERS' ALLIANCE is the name of a political party whose earliest organization dates from 1881, though the movement that led to it is identified with the history of the Grange (q. v.). In 1881 a Farmers' Congress was held in Chicago, and though scantily attended, annual meetings of the body then organized were held at Washington, Nashville, Louisville, and Indianapolis. On Dec. 3, 1885, it adopted a constitution, and as the same meeting (held in Indianapolis) Robert Beverly, of Virginia, was chosen president; Benjamin F. Clayton, of Iowa, secretary; and J. B. Connor, of Indiana, treasurer. The constitution adopted gives a clear indication that there were no subordinate organizations, for, after declaring its name to be the "Farmers' Congress of the United States," and its object "to advance the agricultural interests of the Union," Section 2 announces that the congress shall be composed of the same number of delegates as the Congress of the United States, apportioned similarly to the several states and territories of the Union, and, in addition, that "one member from each agricultural college, and all heads of Bureaus of Agriculture in each State and of the United States, are ex-officio members of this organization." Further on it is provided that "the governors of the different states and territories are requested to appoint the delegates heretofore provided for, and also to appoint alternates," and, in case of their failure to comply, the appointments are to be made by the vice-presidents, of whom there is to be one from each state, elected by the delegates of their respective states. These same vice-presidents are charged with the executive functions of the congress in the several states. It is evident, therefore, that at this stage of its growth no subordinate organization was even contemplated. The constitution in its other parts merely designates the manner of electing officers, defines their duties, and limits the terms of office. It puts no restrictions on discussions, but the twelfth section declares:

"The Congress of Farmers shall assemble annually and have full power to discuss, advise, and perform other duties that may in their judgment advance the interests of the agriculturists of the United States."

At the succeeding meeting, held in St. Paul, Aug. 25-27, 1886, and attended by 273 delegates, the need of definite organization was avowedly recognized and political action foreshadowed. President Beverly, in his annual address, said:

"Since our last meeting all industries have been passing through a period of depression such as has not been experienced by this generation. A pressing necessity demands some definite plan of organization. The resolutions adopted at your last meeting were submitted by your committee to the congress of the United States, and were favorably reported by their committees to each house, where they sank out of sight beneath the dark seas of personal and party politics, with no friend to call them up for consideration. . . . If our public servants feel themselves incapable of dealing with these questions, they must be discharged, and those who are capable must be employed in their places. If existing political parties are incapable of meeting the issues of the hour, we must organize ourselves as a committee of safety. . . . This pernicious policy of working the forces of the government in the service of monopolies and moneyed men has so oppressed and degraded American labor that it is everywhere in a state of angry irritation and revolt, and from every hamlet the outlook is shrouded in darkness."

In conclusion, he appealed to the congress to organize, "not to-morrow, but to-day."

The resolutions adopted called on congress to pass acts creating the office of secretary of agriculture; to extend the Signal Service for the benefit of agriculturists to all parts of the country reached by the telegraph; to appropriate \$3,000,000 for stamping contagious diseases among cattle; to speedily develop all the waterways of the country, especially the Mississippi; to restore the wool tariff to the rate of 1867, and maintain existing tariffs on rice and sugar. The enactment of the law regulating the manufacture and sale of oleomargarine was commended, the same conditions urged to be put on the manufacture and sale of glucose, and regulation of commerce between states demanded. Congress was also asked to incorporate the Farmer's Congress, and the legislatures of the various states to pass laws preventing the "dealing in futures" on agricultural products.

At the same meeting the constitution was so amended as to provide for local, state, county, and township organizations, and the manner of selecting delegates to the congress changed accordingly. As in the case of the Grangers, the local organizations seemed to take a speedier hold on southern soil, especially in the states of Arkansas, Tennessee, Alabama, and South Carolina. In the congress of 1889, held at Montgomery, Ala., Nov. 13-15, was assembled the largest gathering of representative agriculturists ever held in the United States up to that time. The resolutions adopted opposed "all combinations of capital in trusts or otherwise to arbitrarily control the markets;" demanded that "while congress maintains the policy of a protective tariff all farm products shall be as fully protected as the most favored of the manufacturing industries;" that the tariff on wool imported to make carpets should at least be as high as on that imported to make coats, and threatened if protection to that extent be denied to "call on the farmers of the United States to assert their power at the ballot box."

Among the other things demanded were "more direct and profitable communication" between this country, South America, and Australia; the building of reservoirs for irrigating the arid regions of the Northwest; the organization of a National Board of Agriculture, and commercial treaties discriminating against those countries which have demonetized silver.

The Alliance rose to great importance in the fall election of Nov., 1890. By shrewd combination with minority parties in the different states, they succeeded in electing many of their local candidates. In South Carolina they elected a governor and a state ticket, and dictated the appointment of a United States senator; and in the legislatures of Kansas and Illinois secured a sufficiently large representation to hold the balance of power between the two great parties. In 1892, the Farmers' Alliance joined forces with several other organizations, the new coalition taking the name of People's Party or Populists. In the election of the same year, its candidate for the presidency received a popular vote of 1,122,045, and an electoral vote of 22, and in 1896 the candidate of the Populists and Democrats received a popular vote of over six million and a half.

FARMERS-GENERAL (Fr. *fermiers-général*) was the name given before the revolution of 1789 to the members of a privileged association in France, who farmed or leased the public revenues of the nation. This peculiar system of tax-gathering dates from an ancient period. For each class of imposts there was a special administrative board, presided over by one of the farmers-general, or by one of his assistants. At first, the leasing of the public revenues was based on the competitive system, and determined by the estimates handed it; but latterly, every formality, every preliminary guarantee of this nature disappeared, and the leasing wholly depended on the favor or jobbery of the government officials. The minister of finance selected the farmers-general at his pleasure, but his choice was always regulated by the present, or rather bribe (*pot-de-vin*) offered to him; and which, we may presume, was never inconsiderable, inasmuch as its value was fixed by the minister himself. Generally, shares in the concern were assigned by the king to his favorites, male and female. The number of farmers-general was ordinarily 40, but shortly before the revolution it had risen to 60. The lease was signed by a salaried deputy, who was responsible to the king alone. The king occupied the position of a creditor towards the farmers-general, and could coerce them into payment of the stipulated sum as a just debt; the farmers-general, on the other hand, occupied a similar position towards their subordinates. The entire sum which it was necessary to place in the national treasury—or, in other words, the annual national revenues—amounted to 180 millions of livres. The rest was enormous profit, for we are certainly within the mark in estimating it at seven million of livres. The powers, rights, and duties of the farmers-general were defined by special decree; but however severe may have been the fiscal laws against fraud and contraband, it is notorious that, shortly before the revolution, abuses of the most flagrant description had demoralized the system and the men. The consequence was inevitable. During the revolution, most of these odious tax-gatherers perished on the scaffold.

FARMING'S ISLAND, an island reported to be in the north Pacific ocean, n. of the Sandwich islands, in lat. 30° 49' n., and long. 159° 20' w., was formally taken possession of, for the queen of England, on the 8th Feb., 1861, by her majesty's steamer *Albert*. The harbor was called English Harbor.

FARMINGTON, a town on a river of the same name in Hartford co., Conn., 31 m. n. of New Haven, on the New Haven and Northampton railroad. It was incorporated in 1645, and contains the villages of Farmington and Unionville. There are a high school, young ladies' seminary, savings bank, several churches, and manufactories of paper, bolts, nuts, cutlery, rules, levels, etc. Pop. '90, 3179.

FARMINGTON, town and co. seat of Franklin co., Me., on the Sandy river, 85 miles n.e. of Portland; and on the Maine Central and the Sandy River railroads. It was incorporated in 1794, and has a court-house, churches, national bank, savings bank, trust company, and weekly and monthly periodicals. It contains an excellent high school and public schools, the Farmington State Normal School, the Little Blue School, and a public library. There are slate quarries in the vicinity, and in the town are machine shops, saw and grist-mills, wood-turning, spool and canning factories, and a carriage manufactory. Pop. '90, 3207.

FARM-SERVANTS. The introduction of large farms caused a wide difference to arise between the condition of master and servant. The latter has no doubt had his condition meliorated, though something remains yet to be done. Large farms effect economy in the amount of labor, and where these superseded the small holdings or pendicles, a certain number of the population had to betake themselves to the towns or the colonies. This latter process had the effect of diminishing the population in the country districts. The general advance, however, which has taken place in the wages of the laboring-classes has been happily shared in by farm-servants for some years, and they are now well paid if they were only better housed.

FARNE, FEARNE, or FERN ISLES, or the **STAPLES**, form a group of 17 islets and rocks, some being visible only at low tide, 2 to 5 m. off the n.e. coast of Northumberland, opposite Bamborough. On one of the isles is the tower of a priory, built to the memory of St. Cuthbert, who spent the last two years of his life here. There is a hole called the churn, through which the sea rises. The passage between the isles is very dangerous in rough weather. Two of the islands have each a light-house. Here the *Forfurshire* was wrecked in 1838 (see **DARLING, GRACE**); and here, in 1843, the *Pegasus* met the same fate, and 60 persons were drowned.

FARNESE, the name of an illustrious family in Italy, whose origin can be traced to the middle of the 13th c., when it possessed the castle of Farneto, near Orvieto. Many of its members have filled the highest offices in the church. In 1534, cardinal **ALESSANDRO FARNESE** was raised to the papal see under the title of pope Paul III. (q.v.), and as his great aim was the aggrandizement of his family, he erected Parma and Piacenza into a duchy, which he bestowed on his natural son, **PIETRO LUIGI**. Pietro was one of the most dissolute men of his period, and after many tyrannical attempts to limit the privileges of the nobles, he was assassinated 10th Nov., 1549. He was succeeded by his son **OTTAVIO** (born 1520, died 1586), who married a natural daughter of Charles V., and whose reign was marked by an unbroken peace, and by various efforts made for the good of his subjects.

ALESSANDRO FARNESE, son of Ottavio, was born in 1546. He served his first campaign under his uncle, Don John of Austria, and distinguished himself at the battle of Lepanto, in the year 1571. He afterwards followed his mother into the Low Countries, then in a state of insurrection, and aided in obtaining the victory at Gembloux, 31st Jan., 1578. He was made governor of the Spanish Netherlands by Philip II., and carried on the war against the prince of Orange. The ill success of the expedition against England, to the command of which he had been appointed by Philip II., grieved him the more from the contrast it presented to his former successes. On his return to the Netherlands, he was appointed commander-in-chief of the army dispatched to the assistance of the Catholics in France, and compelled Henry IV. to raise the siege of Paris. Being, however, ill supplied with provisions and money by Philip, and insufficiently supported by the league, he was forced to yield to the superior power of Henry IV., and died soon after at Arras, in 1592. F. was really an able warrior, and though severe in his discipline, was almost worshiped by his soldiery. **RANUCCIO**, his son and successor, did not possess the brilliant qualities of his father: he was somber, austere, greedy, and proud. A conspiracy was hatched against him, and Ranuccio was seized, and thrown into prison. He died in 1622.—**ODOARDO**, a natural son of the preceding, was a prince remarkable for the elegance of his manners, and also, according to Muratori, for his magnificence, magnanimity, and liberality. He died in 1646, at the age of 34.—The family became extinct in the person of **ANTONIO F.**, who died in 1781.

The name of the Farnese family has been bestowed upon several celebrated works of art. These are—1. The *Farnese Palace* at Rome, an edifice raised by pope Paul III., before his accession to the holy see, after the design of Antonio da San Gallo. It is in the form of a quadrangle, and was completed by Michael Angelo. The palace is one of the finest in Rome. The antique sculptures for which it was formerly renowned are now in the museum at Naples; a few classic works, however, are still to be seen in the great hall. The gallery contains the frescoes of Annibal Caracci, which are very valuable, as exhibiting in the most complete manner the new line of art which he struck out. In a room adjoining the gallery, are some mythological fresco-paintings by Domenichino. 2. The *Farnesina* is a very elegant palace in Trastevere. It owes its celebrity chiefly to the frescoes of Raphael; but it also contains frescoes by Peruzzi, Sebastian del Piombo, and a colossal head in *chiar-oscuro*, attributed to Michael Angelo. Among the antiques, formerly belonging to the Farnese family, now in the museum at Naples, are two which still bear the name of their original owners. 3. The *Farnese Bull* is the name given to a colossal group attributed to Apollonius and Tauriscus of Tralles, in Asia Minor, who probably belonged to the Rhodian school, and lived about 300 B.C. The group represents Dirce bound to the horns of a bull by Zethus and Amphion, for ill usage of her mother—a subject which, notwithstanding the vigorous mode of treatment, is on the whole unsatisfactory. Pliny mentions the transference of the group to Rome, where it first adorned the library of Asinius Pollio, and afterwards the baths of Caracalla. It was discovered anew in the year 1546, restored by Bianchi, and placed in the Farnese

palace. 4. The *Farnese Hercules*, copied by Glykon from an original by Lysippus. It exhibits the hero, exhausted by toil, leaning upon his club; the muscles and veins are still swollen, the head inclined, the expression melancholy; one hand rests upon his back, and grasps one of the apples of the Hesperides.

FARNHAM, a t. in the w. of Surrey, on the left bank of the Wey, 10 m. w.s.w. of Guildford. It consists chiefly of one street running e. and west. The principal feature is the stately old castle of the bishops of Winchester, first built by bishop de Blois, brother of King Stephen. The castle was razed by Henry III., rebuilt and garrisoned by Charles I., and restored in 1684 to its present state by bishop Morley. It is an embattled quadrangle of brick, covered with stucco. A new town-hall was erected in 1866. F. has belonged to the bishops of Winchester since 860, when Ethelbald of Wessex bestowed it on them. Some parts of the parish church were built in the 12th, 15th, and 16th centuries. The chief trade is in hops, a very fine variety of which is grown in the vicinity. Pop. '91, 5545. William Cobbett was born and is buried here. The vicinity of Aldershot camp, which is only about 6 m. to the n. of F., has increased the activity of the town.

FARNHAM, ELIZA WOODSON (maiden name BURHANS), 1815-64; b. N. Y.; married in Illinois to Thomas J. Farnham, the traveler. In 1841, she returned to New York, visited prisons, and lectured to the women convicts until 1844. She was four years matron of the Sing Sing state prison. In this period she published *Life in Prairie Land*, and edited Samson's *Criminal Jurisprudence*. In 1848, she was connected with the Boston institution for the blind. She was in California from 1849 to 1856, then returned to New York, and published *California, Indoors and Out*. *My Early Days* appeared in 1859, and in that year she organized a society to aid and protect destitute women in emigration to the west. *Women and Her Era* was published in 1864.

FARNHAM, RALPH, 1756-1861; b. Me.; a soldier in the revolution, and the last survivor of the battle of Bunker hill. He was the first settler in Acton, Me. He lived 104 yrs. 5 ms. and 19 days. About a year before his death he was complimented by a grand concert in Tremont temple, Boston.

FARNHAM, THOMAS JEFFERSON, 1804-48; b. Vt. In 1839, he led a small expedition across the continent to Oregon. In California, the same year, he procured the release of a large number of American and English prisoners from the Mexican government. His *Travels in Oregon Territory* appeared in 1842; *Travels in California and Scenes on the Pacific*, in 1845; a *Memoir of the North-west Boundary Line*, and *Mexico, its Geography, People, and Institutions*, in 1848.

FARN'WORTH, a t. of Lancashire, $2\frac{1}{2}$ m. s.e. from Bolton-le-Moors, near the Tonge, a branch of the Irwell. It is a station on the Manchester and Bolton railway. It has a picturesque embattled chapel, of the 15th century. The manufacture of sail-canvas, watches, files, etc., is carried on. Pop. '81, 19,380; '91, 23,758.

FARO, a pleasant and wealthy episcopal city of Portugal, capital of the province of Algarve, is situated in a plain at the mouth of the Femoso, in lat. 37° n., and long. $7^{\circ} 52'$ west. It has, on the whole, a modern aspect, but its houses are not handsome, and its streets are in general narrow. It is surrounded with walls, which are said to have been built by the Moors. The harbor of F. is somewhat confined, but the road formed by three islands at the mouth of the river affords good anchorage. F. has considerable exports of oranges, figs, anchovies, and cork. It has also a prosperous fishery. Pop. 7,900. The number of blind people here met with is surprising, groups of five and six together being frequently observed. This is accounted for by the light sandy soil which prevails.

FARO, or PHARO, a game at cards of the nature of hazard, played chiefly at gambling establishments. See Hoyle's *Games*.

FAROCHON, JEAN BAPTISTE EUGÈNE, born Paris, 1807; a medalist and sculptor, pupil of David. He studied in Italy as a pensioner of the academy, and on returning to France gained a good reputation for his medallions. He became professor in the school of the fine arts in Paris, 1863. He d. 1871.

FARÖE ISLES (Dan. *Faar-Oen*, sheep-islands), a group of islands, 21 in number, of which 17 only are inhabited, belonging to Denmark, and lying nearly midway between the Shetlands and Iceland, between $61^{\circ} 25'$ to $62^{\circ} 25'$ n. lat., and 6° to 8° w. long. The principal island, Stromoe (capital, Thorshavn), is 27 m. long, and 8 m. broad; those next in importance are Osteroe, Vaagoe, Boroe, Videroe, Sandoe, and Syderoe. Their entire area is 514 sq. m.; pop. 1890, 12,955. The F. I. consist of basaltic elevations, none of which attain a height of 3,000 ft., and trap formations, covered with a thin vegetable soil, which yields pasturage to the cattle and numerous sheep which are reared in the islands. There are no considerable valleys or streams, but small fresh-water lakes are numerous. The coasts, which are steep and lofty, are broken by deep inlets, whirlpools, and rapids, which render navigation perilous. The furious hurricanes which prevail, prevent the growth of trees, or even of most of the ordinary vegetables and cereals; but the climate is so greatly modified by oceanic influences, that, notwithstanding the high latitude, snow rarely lies long on the ground, and the cattle can pass the greater

part of the year in the open air. Peat and coal are used for fuel; the chief minerals are opals and coal, but traces of iron, copper, chalcedony, etc., are found. The chief sources of wealth are flocks of sheep and the multitudes of sea-fowl which frequent the rocks. The islanders show considerable skill in climbing the dangerous cliffs in search of birds, and they are also expert in fishing for seals and whales. Their manufactures are of the homeliest kind, but in return for the numerous articles supplied to them by the mother-country, they yield tallow, train-oil, feathers, skins, and butter to the Danish markets. The people are of Norwegian origin, a vigorous, laborious, loyal, and religious race, and belong to the Lutheran church. They are governed by a Danish *amtmand*, or bailiff, and a land *vogt*, or director of the police and municipal departments, and are represented in the Danish legislature by a deputy appointed by the king. The islands, which were discovered in the 9th c. by Norwegians, have belonged to Denmark since the incorporation of Norway with that kingdom by the union of Calmar, and the language of the people is only a slightly modified form of the old Norse. England held the islands from 1807 to the treaty of Vienna, in 1814. Some account of the F. I. will be found in prof. sir Wyville Thomson's book, *The Depths of the Sea* (Macmillan & Co., 1873).

FARQUHAR, GEORGE, was b. at Londonderry in 1678, and received his education at the Dublin university, where, although he did not take any degree, he secured among his comrades the reputation of a wit who was a spendthrift of his witticisms. When he left the university, he was engaged as an actor by one of the Dublin theaters, but like most dramatists who have figured on the stage, he proved but an indifferent performer. Playing a part in Dryden's *Indian Emperor*, and forgetting that he wore a sword instead of a foil, he accidentally wounded a brother-performer, and was so shocked by the occurrence that he at once quitted the boards. Accompanied by the actor Wilks, he proceeded to London, and shortly after received a commission in the regiment commanded by the earl of Orrery, which was then stationed in Ireland. Urged by Wilks, and perhaps stimulated by the gayety and leisure of military life, he in 1698, produced his first comedy, entitled *Love and a Bottle*, which proved a success. Two years afterwards his *Constant Couple* appeared, which met with a brilliant reception, and to which he wrote a sequel, called *Sir Harry Wildair*. In 1703, he produced *The Inconstant* founded on the *Wild-geese Chase* of Beaumont and Fletcher, a version in which all the coarseness, and none of the poetry, of the elder dramatists is retained. He married in the same year, and falling into serious pecuniary difficulties he sold his commission, and, struggling with adverse fortune, succumbed. He died of decline in 1707, leaving "two helpless girls" to the care of his friend Wilks. During his last illness, he wrote the best of his plays, *The Beau's Stratagem*—in six weeks, it is said—and died while its wit and invention were making the town roar with delight.

F. is one of the finest of our comic dramatists, although Pope called him a "farce writer." He is less icily brilliant than Congreve, and possesses on the whole more variety of character than any of his compeers. He had wit in abundance, but he had humanity too. He was a tender-hearted and somewhat melancholy man, and—what was rare in his school and in his time—*tears* are found glittering among the brilliants of his fancy.

FARR, WILLIAM, M.D., F.R.S., an eminent statistician, was b. at Kenley, in Shropshire, Nov. 30, 1807, became an assistant-surgeon at the Salop infirmary in 1826, and after attending privately the medical and scientific classes of the day, went to Paris university in 1829, where he attended the lectures of the most eminent medical professors. In 1831, he returned to England, and became a member of the university of London, where he completed his professional curriculum. Farr devoted himself mainly to a consideration of the important questions resulting from medical statistics. In 1837 his article, "Vital Statistics," in McCulloch's *Statistics of the British Empire*, attracted attention. A registration of deaths and their causes was commenced in England, and subsequently F. was made superintendent of a statistical department which has issued the new *London Tables of Mortality*, etc. He pub. *Statistical Nosology*, and valuable papers on public questions. He d. 1883.

FARRAGUT, DAVID GLASCOE, Admiral; born near Knoxville, Tenn., 1801, July 5; d. Portsmouth, N. H., 1870, Aug. 14. His father, a Spaniard, had served in the Am. navy during the Revolutionary war, and on the outbreak of the second war with England became master on the "Essex." David was appointed midshipman and assigned to the same ship, being present at several engagements in that war. He was promoted lieutenant, 1835, Jan. 13; lieutenant-commander, 1841, Sept. 8; and captain, 1855, Sept. 14. During the winter of 1861-2 he commanded the Western Gulf blockading squadron. In the "Hartford" he entered the Mississippi with the squadron, and, 1862, April 24, passed the confederate forts Jackson and St. Philip, the next day taking possession of New Orleans. He then attacked and captured the principal Gulf ports of Texas. F. was made rear-admiral, 1862, July 11; ascended the Mississippi, 1863, March, to take part in the investment of Vicksburg, assisting in the capture of that place and of Port Hudson, 1863, July; defeated the confederate fleet in Mobile Bay, 1864, Aug. 5, and by the 23d of the same month silenced the defenses and captured Mobile. The rank of vice-admiral was created for him, 1864, Dec. 21, and, 1866, July 25, he was made admiral. His passage of the forts below New Orleans was one of the most brilliant achievements in naval history.

FARRAKHÁBÁD, or FURRUCKÁBAD, a district in the Agra division of the N. W. Provinces of British India; a flat alluvial plain on the Ganges, which has a course through and along the district of 87 m.; 1720 sq. m.; pop. '91, 859,000. The chief town, on the Ganges, bears the same name.

FARRANT, RICHARD, a composer of English church music in the 16th c.; b. about 1530; d. at Windsor in 1585. Among the most admired of his compositions are the anthems *Call to remembrance*, and *Hide not thy face*. He is credited on insufficient proof with being the author also of *Lord, for thy tender mercies' sake*.

FARRAR, ELIZA WARE, 1791-1870; a daughter of Benjamin Rotch, of New Bedford, Mass.; b. Flanders (Europe); in 1828, married Prof. John Farrar of Harvard College. She was the author of *Congo in Search of his Master*; *Children's Robinson Crusoe*; *The Story of Lafayette*; *The Life of Howard*; *Youth's Letter-Writer*; *Young Lady's Friend*; and *Recollections of Seventy Years*. Her later years were spent in Springfield, Mass.

FARRAR, FREDERIC WILLIAM, D.D., b. Bombay (India), 1831; graduate of Cambridge, Eng.; master of Marlborough college in 1871; made chaplain in ordinary to the queen in 1873; canon of Westminster in 1876, and archdeacon and rural dean in 1883; and dean of Canterbury in 1895. He has published *Eric*; *Julian Home*; and *St. Winifred's*. His philological works are *The Origin of Language*; *Chapters on Language*; *Greek Grammar Rules*; *Greek Syntax*; and *Families of Speech*. Among his theological works are *Seekers after God*; *The Silence and Voices of God*; *The Witness of History to Christ* (the Hulsean lectures for 1870 before the university of Cambridge); and *The Life of Christ*, which, among the many recent works on the same theme, is of great importance and interest as the matured production of one who has lovingly studied the scripture testimony concerning Christ, aided by the lights of literature and discussion, as well as by his own sojourn in the land where that life was lived; and who, with faith in the manifestation of Christ's divine work through nearly 19 centuries, seeks in the words and works recorded in the gospels the causes which awakened faith in Christ before the Christian history had been developed or the Christian name known. *The Life and Work of St. Paul* is a companion work to the preceding. His *Eternal Hope*, while not professing to invalidate the received doctrine of the church regarding the future of the ungodly, has met severe criticism as tending to reduce the stringency of the application of those doctrines. He visited the United States in 1885, and the *Sermons and Addresses* delivered there were published 1886; in the same year he published *A History of Interpretation*. Other works are *The Early Days of Christianity* (1882); *Sermons by the Way* (1887); *Lives of the Fathers* (1888); *Sketches of Church History* (1889); *The Life of Christ as Represented in Art* (1894); *The Book of Daniel* (1895); *Gathering Clouds* (1896), etc.

FARRAR, JOHN, LL.D., 1779-1853; b. Mass.; graduated at Harvard in 1803, and studied theology at Andover; was Greek tutor at Harvard in 1805; in 1807 became Hollis professor of mathematics and natural philosophy. He published a translation of Lacroix's *Elements of Algebra*, and contributed many articles to scientific periodicals. In consequence of ill-health he resigned his chair in 1836.

FARRAR, TIMOTHY, LL.D., 1747-1849; b. Mass.; graduated at Harvard College, 1767. He settled in New Hampshire and taught school about 1770. He was a maj. in the American army in the revolution; was a justice of the common pleas for 40 years. In 1842 he was appointed chief-justice of New Hampshire. He was also a member of the State constitutional convention, and one of the committee which drafted the constitution.

FARREN, ELIZA, Countess of Derby, 1759-1829; an English actress, playing with great success in the London theatres in the latter part of the last century. In 1797 she married the 12th earl of Derby, a widower.

FARRER, HENRY, b. London, Eng., 1843; an artist in water colors, also a fine etcher, residing in New York; brother of Thomas Charles Farrer.

FARRER, THOMAS CHARLES, b. London, 1838; an English artist; studied drawing in Ruskin's free school, and in 1858 came to the United States. In the war of the secession he served in the union ranks as a private. Soon after the war he returned to England, where he still resides.

FARRIER (from *ferrum*, iron), a person who shoes horses and treats their diseases. The better class of farriers often were, and indeed still are, men of great shrewdness and observation, sometimes possessing considerable experience, and with skillful, useful hands. Their management of sick horses is occasionally sensible, but generally altogether empirical. They have usually but crude ideas of the structure, functions, or diseases of animals, and pin their faith mainly on a few carefully cherished recipes. To their calling as horse-doctors and shoeing-smiths (see **SHOEING**), they usually unite those of cow-leech and cutter of colts and pigs, and although still met with in many of the rural districts of England and Ireland, their practice is passing into the hands of regularly educated veterinarians. See **VETERINARY MEDICINE**.

FARRIERS, ARMY. Farriers-major and farriers are non-commissioned officers in the cavalry, artillery, engineers, and military train, whose duty it is to shoe the horses of their corps, and, generally, to assist the veterinary surgeon in exercising a proper care over the regimental animals. They receive the same pay as other sergeants (with whom they rank) and, in addition, certain allowances proportionate to the number of animals in charge.

FARRIERY. See **FARRIER** and **HORSESHOEING**.

FARS, or **FARSISTAN** (anciently *Persis*), a province of Persia, on the e. shore of the Persian gulf, lying between lat. 27° 30' and 31° 30' n., and between long. 49° 30' and 55° east. The coast region is flat, with a hot climate; inland, the ground rises to an elevation of from 2,000 to 3,000 ft., the climate is cooler, and valleys, alike remarkable for their beauty and fertility, ranging from 15 to 100 m. in length, are numerous. East of this hilly district the province again become flat and sandy; and here occurs the large salt-lake Bakhtegan. The chief rivers are the Bundemeer (anciently Araxes), the Nabon, and the Tab (anciently Arosis). The province produces tobacco, wine, rice, dates, opium, linen, cotton, silk, cochineal, and roses for the manufacture of attar. It has iron and lead mines, marble and alabaster quarries, and yields also borax and naphtha. It trades mainly with India. The principal towns are Shiraz, Jehroom, Darab or Darabgerd, Behbahan or Babahan, and Bushire. North of Shiraz, at a distance of about 30 m., lie the ruins of the ancient and splendid city of Persepolis. F. also contains the remains of Shalpur, a city older than the age of Alexander the great, and the celebrated sculptured rocks, called by the Persians *Naksh-i-Rustam*. A cold winter and heavy floods prevailed in 1873-74, which caused great damage to property; nearly one third of the city of Shiraz was destroyed by the floods.

FARSAN' ARCHIPEL AGO, a group of islands in the s.e. of the Red sea, the chief of which are Farsan Kebeer, 31 m. long, and Farsan Seggeer, 18 m., in lat. 16° 30' to 17° n., and long. 41° 45' to 42° 10' east. They would be valuable as harbors, were it not for the reefs in the vicinity.

FARTHING (Sax. *feorthing*, from *feorth*, fourth), the fourth part of a penny (q.v.).

FARTHINGALE, old form of the word (as found in bishop Latimer) *verdingale*, is probably a corruption of the French *vertugade*, which is itself a corruption of *vertugade*, signifying guard of modesty. For a description of the F., see **CRINOLINE**.

FARWELL, CHARLES BENJAMIN, b. N. Y., 1823; was elected as a republican from Ill. to the XLIIId and two succeeding congresses; also to the XLVIIth congress; elected U. S. senator, 1887, to fill the unexpired term of Gen. Logan.

FASANO, a t. of Italy, in the province of Bari, and 33 m. s. e. of the town of Bari; is situated on the high road from that town to Brindisi. Pop. about 18,000.

FASCES were bundles of rods usually made of birch, but sometimes of elm, with an axe projecting from the middle of them, which were carried before the chief magistrates of ancient Rome, as symbols of their power over life and limb. They were borne by the lictors, at first before the kings; in the time of the republic, before consuls and prætors; and afterwards before the emperors. Their number varied, a consul having twelve, and a prætor six; but within the city only two. Valerius Publicola introduced a law that within the city the axe was withdrawn, except in the case of a dictator, who was preceded by 24 lictors, bearing as many fasces. Publicola also made the F. be lowered at the assemblies of the people, as an acknowledgment of their supreme power.

FASCIÆ, in architecture, a flat space or band, like a broad ribbon, usually between moldings of the architrave. Architraves are called single, double, or triple fasciæ architraves, according to the number of fasciæ into which they are divided.

FASCINATION BY SERPENTS. A power has long been popularly ascribed to serpents, or at least to some kinds of them, of fascinating by their eye the small animals on which they prey, so as to prevent the escape of the intended victim, when its escape would otherwise be easy, and to cause it rather to run or flutter into the mouth which is open to devour it. This popular notion has been ridiculed, but is supported by a large amount of evidence, and has been fully adopted by some of the most scientific observers. In the earlier part of last century, Kalm described the rattlesnake as frequently lying at the bottom of a tree, on which a squirrel is seated, and fixing its eyes on the little animal, which from that moment cannot escape, but begins a doleful outcry, comes towards the snake, runs a little bit away, comes nearer, and finally is swallowed. Le Vaillant describes a similar scene, as witnessed by him in Africa, a shrike incapable of moving away from a serpent which was gazing fixedly at it, and dying of fear, although the serpent was killed. Dr. Andrew Smith states that the presence of a non-venomous South African tree-snake, *bucephalus viridis*, in a tree, causes the birds of the neighborhood to collect around it and fly to and fro, uttering piercing cries, "until some one, more terror-struck than the rest, actually scans its lips, and almost without resistance, becomes a meal for its enemy." He adds, "whatever may be said in ridicule of fascination, it is nevertheless true that birds, and even quadrupeds, are, under certain circumstances, unable to retire from the presence of certain of their enemies; and what is even more extraordinary, unable to resist the propensity to advance from a situation of actual safety, into one of most imminent danger. This I have often seen exemplified in the case of birds and snakes; and I have heard of instances equally curious, in which antelopes and other quadrupeds have been so bewildered by the sudden appearance of crocodiles, and

by the grimaces and contortions they practiced, as to be unable to fly, or even move from the spot towards which they were approaching to seize them." Ellis, in his *Three Visits to Madagascar*, records anecdotes of the same kind, and one in particular, of a frog apparently unable to move, until an object was pushed between it and the eye of the snake, when the frog immediately darted away.

FASCINES (from Lat. *fascis*, a bundle) are fagots for military purposes made of young branches of trees or brushwood, and also of osiers, bound together with yarn or withes. They are about a foot in diameter, and of various lengths, averaging 12 ft., according to the object for which they are intended. F. are used in the construction of temporary works; for filling a ditch, and sometimes, in a pile, for setting fire to an obstruction. Before a siege, the soldiers are employed in making F. in great number; and when needed, each soldier bears one to the place, casts it on the heap, and the quantity required is thus accumulated in a remarkably short time. See illus., **FORTIFICATION**, vol. VI.

FASCIOLA, a generic name formerly employed to designate all the *trematode entozoa*, as flukes, etc., which are now, however, divided into many genera.

FASHION, or, as the French term it, *la mode*, admits as little of exact definition as of being referred to any intelligible principle. In every age and country, there has been a recognizable costume or general style of male and female attire, along with certain niceties in the shape, color, and texture of dress, which, fluctuating according to taste or whim, are known as the F.—a word which etymologically signifies making in a particular form. The terms F. and fashionable are, however, so comprehensive as to include much beyond the sphere of the toilet; as, for example, a style of speaking, living, and forming opinions; there being, to use a common phrase, "a fashion in everything." It is only in China and some other eastern countries that, in consequence of dress being regulated by sumptuary laws or some equally strict traditions, the fashions of attire remain from generation to generation with little or no change.

The nature of clothing, and the necessity for its use, being treated in the articles **WEAVING** and **SANITARY SCIENCE**, what seems desirable here is to glance at the leading forms of dress and more conspicuous fashions that have prevailed in western Europe, and more particularly in England, since the dawn of civilization. Our modern costume has seemingly had a double origin—that of the Romans and of the Teutonic people, who in different branches invaded France and Britain. The usual Roman dress, in the latter period of the empire, consisted of a tunic, or loose upper garment, with a dress for the lower limbs, called *bracæ*; hence the modern term *breeches*. Over all was occasionally worn by the higher classes the *toga*, or mantle. It is believed that these Roman costumes were generally copied by the greater number of British, at least among the more opulent classes. In the dress of the women, however, there was but little change. They appear in two tunics, the one reaching to the ankles, the other having short sleeves, and reaching about half-way down the thigh: in other words, they resemble a round gown, or bedgown and petticoat, though the latter, distinct from a body and sleeves, is not considered to be ancient. This tunic was called in British *gwn*; hence our word *gown*, of which we still see specimens of short dimensions worn by women of the humbler classes in England, Scotland, and Wales.

The Anglo-Saxon and Danish periods of English history are marked by new peculiarities in costume. Soon after the departure of the Romans, and the arrival of the Saxons in the 5th c., fashions of apparel were introduced from northern Germany, which continued with no material change for several centuries. The most important improvement in the ordinary dress of the people was the introduction of the *shirt*, a linen garment worn next the skin, for which we are indebted to the Saxon invaders. The common dress of the 8th c. consisted, as we find, of linen shirts; tunics, or a kind of surcoat; cloaks fastened on the breast or shoulders with brooches; short drawers met by hose, over which were worn bands of cloth, linen, or leather, in diagonal crossings. Leathern sandals were worn by the early Anglo-Saxons; but afterwards the shoe became common: it was very simple, and well contrived for comfort, being opened down the instep, and there, by a thong passed through holes on each side of the slit, drawn tight round the feet like a purse. A felt or woollen cap, called *hæt* (hence our modern word *hat*), was worn by the higher class of Anglo-Saxons; but it is generally believed that the serfs or lower orders were without any other covering for the head than what nature had given them. The Anglo-Saxon tunic still exists in the *smock-frock*, a species of overall generally worn by the peasantry and some farmers in England. The *blouse*, worn by workmen in France and Switzerland, has an equally early origin.

The Norman conquest introduced greater taste and splendor into British costume. Now, were introduced gloves (q. v.), along with the fashions of chivalry. A gentleman of the reign of Henry V. was dressed in a short tunic, buttoned in front, with girdle, large loose sleeves, tight hose forming pantaloons and stockings in a single piece, peaked shoes, and head-cloth or cap. About this period, silks and velvets of divers colors came into use among the higher classes, by whom gold chains were generally worn. The dress of ladies was of the richest kind. Gowns were embroidered and bordered with furs or velvet; and the bodice, laced in front over a stomacher, now first appeared. But the greatest eccentricity was the lofty steeple head-dress; this consisted of a roll of

linen, covered with fine lawn, which hung to the ground, or was mostly tucked under the arm.

In the 16th c., the upper part of the long hose or nether garments began to be worn loose, or slashed with pieces of different colors let in, and the arms and shoulders of the doublet or jacket were fashioned in a similar style. Boots were also worn loose on the leg, with the upper part falling down; hence the origin of the *buskin*. Ruffs or ruffles, collars, and velvet bonnets with feathers, came likewise into use, as may be seen from the paintings of Henry VIII. Hall, the chronicler, describes several of Henry's superb dresses, and among them a *frocke*, or coat of velvet, embroidered all over with gold of damask, the sleeves and breast cut and lined with cloth of gold, and tied together "with great buttons of diamonds, rubies, and orient pearls." The cloaks and mantles were of corresponding magnificence. The shirts were pinched or plaited, and embroidered with gold, silver, or silk. The term *hose* continued to be applied to the entire vestment, from the waist to the feet, throughout this century; the material is more distinctly stated, for Henry wore knit silk as well as cloth hose: the precise period of the separation of the hose into breeches and stockings, is not so clear as the derivation of the latter term from the "*stockying* of hose;" "that is, adding the lower part that covered the legs and feet to that which was fastened by points to the doublet," and was called the *stocks*. The shoes and buskins were of the German fashion, very broad at the toes, and of velvet and satin, slashed and puffed. The hats, caps, and bonnets were of almost endless forms and colors.

The dress of the middle ranks in the reign of Henry VIII. may be seen in prints of the time; plain russet coats, and a loose kind of kersey breeches, with stockings of the same piece, were the ordinary suit; and the London apprentices wore blue cloaks in summer, and gowns of the same color in winter, as badges of servitude; for this appears to have been the age of domestic distinctions—the relics of the feudalism of the middle ages. The women wore russet, or long woollen gowns, worsted kirtles (hereafter called *petticoats*), and white caps and aprons, and white underlinen came into general wear.

The principal novelty of the reigns of Edward VI. and Mary was the flat round bonnet or cap, of plain velvet or cloth, worn on one side of the head, and decorated with a jewel and single ostrich feather. The bonnet itself is preserved in the caps worn at the present day by the boys of Christ's hospital; and their blue coat and yellow stockings are such as were worn by the London apprentices at the date of the foundation of the hospital by the youthful Edward. See *HOSIERY*.

The male costume in Elizabeth's reign was the large trunk hose, long-waisted doublet, short cloak, hat, band, and feather, shoes with roses, and the large ruff; but the great breeches, "stuffed with hair-like woolsacks," after the separation of the hose into this garment and stockings, appear to have been worn throughout the reign; they were made of silk, velvet, satin, and damask. The doublets were still more costly, and quilted and stuffed, "slashed, jagged, pinched, and laced;" and over these were worn coats and jerkins in as many varieties as there are days in the year. The cloaks were of the Spanish, French, and Dutch cuts, of cloth, silk, velvet, and taffeta of all colors, trimmed with gold, silver, and silk-lace and glass bugles, inside and outside equally superb. The stockings, shoes, slippers, and ruffs resembled those of the ladies.

Hats now began to supersede the bonnets of a former era. Those of beaver were exceedingly expensive, and they were for the most part made of felted wool, dyed. The most remarkable thing about these hats was their numerous shapes; some were steeple-crowned; others were flat and broad, like the battlements of a house; and others with round crowns, and bands of all colors, and ornamented with huge feathers, and brooches, clasps, and jewels of great value. See *HAT*.

As regards female attire, the more conspicuous features in the reign of Elizabeth were the farthingale (q.v.) and ruff. The farthingale, or fardingale, consisted in an extravagant expansion of the lower garments, by means of cane or whalebone, by which the lady seemed to walk in a kind of tub. The farthingale, which is referred to by Shakespeare, Butler, and other writers, mostly in a satiric vein, was the predecessor of the hoop, which in its turn, after an interval, was succeeded by the crinoline (q.v.) and hoop-work of steel. The widely extended ruff of fine linen, like a huge frill, is seen in the pictures of Elizabeth and her envied rival, Mary queen of Scots, both stars of F. in their day.

Under James I., the male costume was somewhat more Spanish, as respects the slashing and ornamenting of the doublet and breeches. Late in the reign, however, the jackets or doublets were shortened, and the breeches reduced in size, and fastened in large bows at the knees; the well-stockinged leg was admired, and the hat worn low in the crown, and with broad brim, as seen in portraits of the date 1619. Beards and whiskers had become almost universal in the reign of Elizabeth; but in that of James, the former was sometimes worn trimmed to a point, hanging down at the division of the ruff.

In the female costume, there was little change. The farthingale continued to be worn by ladies of quality; a strong passion for foreign lace was introduced; pearls were the favorite jewels; and the ruff maintained its sway, so as to be anathematized from the pulpit; and the fancies of female costume were glanced at in a sermon preached before the king at Whitehall in 1607-8, as "her French, her Spanish, and her foolish fashions."

The F. of dress in the reign of Charles I. became still more decidedly Spanish and picturesque. There were now worn collars of rich point-lace, large and hanging down on the shoulders, held by a cord and tassel at the neck, and now called *Vandyke*, from its being the most striking part of the dress in which Vandyke at that time painted portraits.

The principal habits were vests and cloaks of velvet, or silk damask, short-trousered breeches terminating in stuffed rolls, and fringes and points, and very rich boots, with large projecting lace tops. A dress of Charles is thus described: A falling band, green doublet (from the armpits to the shoulders wide and loose), zigzag turned-up ruffles, long green breeches (like a Dutchman's), tied below the knee with yellow ribbons, red stockings, green shoe-roses, and a short red cloak lined with blue, with a star on the shoulder; the king sometimes wore a large cravat, and at other times a long falling band with tassels. The dress of the gay courtiers or cavaliers consisted of a doublet of velvet, silk, or satin, with large loose sleeves, slashed, and embroidered; Vandyke collar and band, and short embroidered cloak, worn on one shoulder; the long breeches, fringed and pointed, met the ruffled tops of the boots; the embroidered sword-belt was worn over the right shoulder, and in it was hung a Spanish rapier, and in the flapping beaver hat was worn a plume of feathers confined by a jewel. A buff coat or jerkin was often worn, as a better defense than the doublet, which it sometimes covered.

The female costume of this period was rather elegant than splendid. Gowns with close bodies and tight sleeves were worn, though the farthingale was retained, with a gorget ruff standing up about the neck like a fan. French hoods were still worn, though with little distinction as to rank. The hair was worn in small curls, and the hoods, of all colors, fastened under the chin with curious effect. Ear-rings, necklaces, and bracelets were much worn; but the Puritans forbade the females to wear lace, jewels, or even braided hair; and they retained the close hood and high-crowned hat.

Towards the close of the reign of Charles I., the cumbrous farthingale disappeared, with the yellow starched ruff and band. These tasteless fashions being dismissed, the female dress became very elegant, with its rich full skirt and sleeves, and falling collar edged with rich lace, and the hair worn in graceful ringlets; but these vanities were condemned by the Puritan party.

With the restoration of Charles II. came certain tasteless innovations upon the elegant Vandyke costume of the time of Charles I., which were the first resemblance to the coats and waistcoats of the present day. Thus the most picturesque attire lasted little more than a quarter of a century. Its decline was gradual; its chivalric character soon degenerated into grotesqueness, which in its turn changed to stark meanness. Early in the reign of Charles II., the doublet was much shortened, and worn open in front, where, and at the waistband, the rich shirt was shown; and the loose sleeves and breeches were decked with ribbons and points, and from the knee-bands hung long lace ruffles. At the wrists, too, ruffles were worn; but the lace-collar was shorn of its points. The cloak was retained upon the left shoulder, and the high-crowned and plumed hat remained for a short time; but the crown of the hat was soon lowered.

The petticoat breeches were another absurdity; although ornamented with ribbons at the sides, the lining strangely appeared below the breeches, and was tied at the knees; to match which, the sleeves of the doublet only reached to the elbows, and from under them bulged the ruffled sleeves of the shirt, both being ornamented with ribbons. Meanwhile the skirt of the doublet had been lengthened from above the waist nearly to the knees, and had buttons and button-holes in its entire length, thus becoming a *coat*, and so named in an inventory of 1679; wherein also are the items of *waistcoat*, *breeches*, *pantaloon*, *drawers*, and *trousers*, being the earliest mention of these articles. Stockings of various kinds were common; and "the lower ends of stockings" are understood as socks. Instead of the lace-collar was worn the long square-ended cravat, of the same material, from Brussels and Flanders.

Passing to the reigns of James II. and William III., we find the male attire gradually fashioned according to the artificial costume of the court of Louis XIV. Every article of dress was now more prim and exact. The petticoat breeches were exchanged for the close-fitting garments tied below the knee, and therefore called *knee-breeches*; the broad-rimmed hats were turned up on two sides and edged with feathers or ribbons; we began to see the rich long lace cravat and embroidered waistcoat; and the band was now narrowed, so as to resemble that worn at the present time by clergymen. Wigs, which had been some time in use, were worn still longer than hitherto, hanging down in front, or flowing upon the shoulders, though the color was altered from black to suit the complexion. From the 17th to the end of the 18th c., was the era of *hair-powder* (q. v.), *wigs* (q. v.), and cocked-hats; in these as in other matters there being an excessive artificiality in the tastes of the higher classes. A gentleman of 1750 might have been seen with his flowing coat and ample cuffs, frills at the wrist, deep waistcoat hanging over the legs, long white hose drawn over the knees, his cocked-hat folded under his arm, and in his hand an open snuff-box. Such was the appearance of what is traditionally known as the "old English gentleman." The coats of the 18th c. were of velvet, silk, or satin, as well as broadcloth, and their colors very fanciful. Hogarth's favorite color was sky-blue; Reynolds's deep crimson and violet; and Goldsmith rejoiced in plum-color. About 1790, cloth became the general wear; the waistcoat being of the

costlier materials, and embroidered, and sometimes the breeches. Buckles were worn at the knees and in the shoes till the close of the century; and the large square plated buckle was the *ton* until 1791, when shoe-strings became general. Among the artificialities of dress during the greater part of the 18th c., none was more odious than that of hoops worn by ladies, who, by these means of expansion, were made to appear as if standing in an inverted tub. In the reigns of George I. and II., a loose kind of drapery at the back of the dress, called a *sacque*, and hooded silk-cloaks, were worn, also a very small muff, such as have been lately revived. In the 18th c., after the disuse of towering head-dresses, veils (q.v.) of an elegant fabric were introduced, and the fan (q.v.) was an important article for ornament and flirtation.

The formalities of the 18th c. received a severe blow at the French revolution; and in the ten years from 1790 to 1800 a more complete change was effected in dress, by the spontaneous action of the people, than had taken place at any previous period in a century. The change began in France, partly to mark a contempt for old court usages, and partly in imitation of certain classes of persons in England, whose costume the French mistook for that of the nation generally. This new French dress was introduced by the party who were styled the *Sans Culottes*. It consisted of a round hat, a short coat, a light waistcoat, and pantaloons; a handkerchief was tied loosely around the neck, with the ends long and hanging down, and showing the shirt-collar above; the hair was cut short, without powder, *à la Titus*, and the shoes were tied with strings.

The comparatively simple form of dress of the *Sans Culottes* found many admirers in England, and soon became common among young men; the change from antique fashions was also greatly helped by the imposition of a tax on the use of hair-powder, which was henceforth generally abandoned. Pantaloons, which fitted closely to the leg, remained in very common use by those persons who had adopted them till about the year 1814, when the wearing of trousers, already introduced into the army, became fashionable. It is proper, however, to mention that trousers had, for the previous fifteen or twenty years, been used by boys, and were perhaps from them adopted by the army. Previous to the French revolution, the dress of boys was almost the same as that of men. Although trousers—called by vulgarians *pants*—were generally worn after 1815, many elderly persons still held out in knee-breeches against all innovations, and to the present day an aged gentleman may occasionally be seen clinging to this 18th c. piece of dress. The general use of white neckcloths continued, notwithstanding the introduction of the standing collar, till the reign of George IV., when this monarch's taste for wearing a black silk kerchief or stock, and also the use of black stocks in the army, caused a remarkably quick abandonment of white neckcloths and the adoption of black instead. The year 1825, or thereabouts, was the era of this signal improvement in costume.

While these leading changes were effecting, other alterations of a less conspicuous nature were from time to time taking place. The disbanding of the army after the peace of 1815 led to various transformations besides those we have mentioned. While pantaloons were the fashionable dress, it became customary to wear Hessian boots; these, which had originated among the Hessian troops, were without tops, and were worn with small silk tassels dangling from a cut in front; being drawn over the lower part of the pantaloons, they had a neat appearance; but the keeping of them clean formed a torment that prevented their universal use. See *Boots*. When trousers were introduced from the practice of the army, the use of Wellington boots to go beneath them also became common. Referring to the era of 1815 to 1825 as that in which trousers, Wellington boots, and black neckcloths or stocks came into vogue, we may place the introduction of the surtout in the same period of history. From the time when the collarless and broad-skirted coat had disappeared about the commencement of the century, the fashion of coats had changed in various ways till the above-named era, when the loose frock-coat or surtout was added to the list of garments.

Such is the general account of the progress of fashions in England until nearly the present day. In these fashions, the Welsh, Irish, and Scotch have participated, and there is now little to distinguish the inhabitants of one part of the United Kingdom from another. What differences exist in particular localities—as, for instance, the round hats of the women in Wales, the checked gray *plaid* of the lowland Scottish peasantry, and the *tartan* of the highlanders—will receive some notice under their appropriate heads.

The general simplifying of dress subsequent to 1815, was not unaccompanied by an expiring effort to sustain a high style of fashion. The *macaroni*, or highly dressed beau of the 18th c., was now succeeded by the *dandy*, who, with mincing, affected manners, prided himself on his starched collars, his trousers-straps, and the flashy bunch of seals which dangled from his watch-chain. The regency was the era of this kind of supreme dandyism, but it continued till later times, and characterized a number of leading public personages, of whom notices occur in Raikes's *Reminiscences*, from 1831 to 1851. In the present day, may be noted a kind of break-down of everything like formality in gentlemen's walking costume. Plain cloths, of divers hues, called *Tweeds* (q.v.), have almost superseded materials of a superior quality; cloth caps, or soft felted hats, called *wide-awakes* (see *HAT*), cover the head; and the feet are provided with short ankle-boots instead of Wellingtons. In the evening or dinner costume, however, the old etiquette of

dress-coats and white neck-cloths is still maintained. Among the changes that are taking place in the morning or walking dress, none is so remarkable as the growing fashion of wearing *knickerbockers*. These are wide loose trousers to below the knee, leaving the lower part of the leg only stockinged or covered with leggings. This fashion, which has been copied more immediately from the French *zouaves* (q.v.), and partly perhaps from the common practice of stuffing the lower parts of the trousers roughly into boots in the remote regions of the United States, is very much a resumption of the costumes seen in old Dutch prints. Should it become general, leg-gaiters or boots will come again into use, and the present generation may live to see the fashion of male attire work once more round to the knee-breeches of the 18th century. In female as well as in male costume, fashion seems to have a tendency to work in a circle; of this, the late, but now obsolete, resumption of the farthingale, or hoop, under the name of crinoline, offers a sufficient example.

As to the moral view that may be taken of the whimsicalities of female fashions, we might refer to the numerous papers of Steele in the *Tatler* and *Spectator*, and also the writings of other 18th c. essayists; passing these over, it is enough to quote the words of Hazlitt, a more recent essayist. "fashion," he says, "constantly begins and ends in two things it abhors most—singularity and vulgarity. It is the perpetual setting up and then disowning a certain standard of taste, elegance, and refinement, which has no other formation or authority than that it is the prevailing distraction of the moment; which was yesterday ridiculous from its being new, and to-morrow will be odious from its being common. It is one of the most slight and insignificant of all things. It cannot be lasting, for it depends on the constant change and shifting of its own harlequin disguises; it cannot be sterling, for, if it were, it could not depend on the breath of caprice; it must be superficial, to produce its immediate effect on the gaping crowd; and frivolous, to admit of its being assumed at pleasure by the number of those who affect to be in the fashion, to be distinguished from the rest of the world. It is not anything in itself, nor the sign of anything, but the folly and vanity of those who rely upon it as their greatest pride and ornament. It takes the firmest hold of weak, flimsy, and narrow minds, of those whose emptiness conceives of nothing excellent but what is thought so by others. That which is good for anything is the better for being widely diffused. But fashion is the abortive issue of vain ostentation and exclusive egotism: it is haughty, trifling, affected, servile, despotic, mean and ambitious, precise and fantastical, all in a breath—tied to no rule, and bound to conform to every rule of the minute." For a large variety of amusing particulars concerning fashions, "stars of fashion," etc., during the past two centuries, we refer to Mrs. Stone's *Chronicles of Fashion* (Lond., 2 vols., 1845.)

FASSETT, JACOB SLOAT, was born in Elmira, N. Y., in 1853; studied at Rochester University, and afterwards at Heidelberg in Germany. For some time he taught school at Grand Rapids; but later, returning to Elmira, studied law. He served a short time as district-attorney of Elmira; was elected in 1884 to the state senate, serving four terms. In September, 1891, defeated as republican candidate for governor of New York.

FAST (a word common to the Teutonic tongues, which Grimm derives from a root signifying primarily to hold, keep, observe, and hence to restrain one's self; Lat. *jejunium*, Gr. *néstéa*, Hebr. *tsom*) is the word used to express a certain self-imposed restraint with respect to the nourishment of the body. The abstinence enforced may be either partial, when the restriction is confined to certain articles of food; or total, when all sustenance is dispensed with for a specified time. The origin of the custom seems to be coeval with man's first experience of the salutary influence which abstinence exercises on the health, and with his more or less instinctive consciousness of the necessity of retaining the body in due subjection to the soul. By degrees, the self-mortification which it implied raised it into a sacrifice offered to the Deity; it became a religious observance, was surrounded with rites and ceremonies, and finally bore the stamp of a divine law. Climate, the habits of a people, and their creed, gave it at different periods different characteristics; but it may be pronounced to have been a recognized institution with all the more civilized nations, especially those of Asia, throughout all historic times. We find it in high estimation among the ancient Parsees of Irania. It formed a prominent feature in the ceremonies of the mysteries of Mithras; and found its way, together with these, over Armenia, Cappadocia, Pontus, and Asia Minor, to Palestine, and northward to the wilds of Scythia. The ancient Chinese and Hindus, and principally the latter, in accordance with their primeval view—which they held in common with the Parsees—of heaven and hell, salvation and damnation, of the transmigration of the soul, and of the body as the temporary prison of a fallen spirit, carried fasting to an unnatural excess. Although the Vedas attach little importance to the excruciation of the body, yet the Pavaka, by the due observance of which the Hindu believer is purified from all his sins, requires among other things an uninterrupted fast for the space of twelve days. Egypt seems to have had few or no compulsory general fasts; but it is established beyond doubt, that for the initiation into the mysteries of Isis and Osiris, temporary abstinence was rigorously enforced. In Siam, all solemn acts are preceded by a period of fasting, the seasons of the new and full moon being especially consecrated to this rite. In Java, where abstinence from the flesh of oxen is part of the religion of

all, Buddhists and worshippers of Brahma alike, the manner and times of the observance vary according to the religion of the individual. Again, in Thibet, the Dalai-lamaites and Bogdo-lamaites hold this law in common. That Greece observed and gave a high place to occasional fast days—such as the third day of the festival of the Eleusinian mysteries, and that, for instance, those who came to consult the oracle of Trophœnus, had to abstain from food for twenty-four hours—is well known. It need hardly be added, that the Romans did not omit so important an element of the festivals and ceremonies which they adopted from their neighbors, though with them the periods of fasting were of less frequent recurrence. See *THESMOPHORIA*.

As to the Semitic races, although we find the people of Nineveh undergoing occasional fasts, to which even animals were made to conform, yet the Mosaic law set apart one day only in the whole year for the purpose of fasting. The 10th day of the seventh month (Tishri), called "the Day of Atonement" (Yom Kippur), or, as the holiest of the whole year, "the Sabbath of Sabbaths," was ordained for "the chastening of the *Nephesh*," which the traditional law explains as meaning the strictest and most rigorous abstinence from all food or drink, as also from washing, anointing, the putting on of sandals, etc., from the sunset of the ninth to the rising of three stars on the evening of the tenth day. In process of time, five days of compulsory fasting were added, in commemoration of certain days of humiliation and national misfortune—viz., the 17th of the fourth month (Tamus), as the anniversary of the taking of Jerusalem both by Nebuchadnezzar and Titus; the 3d of the seventh month (Tishri), when Ishmael had killed Gedaliah, the Jewish governor appointed by the Babylonians (Jer. xli. 2); the 10th of the tenth month (Tebeth), in remembrance of the siege of Nebuchadnezzar; the 13th of the twelfth month (Adar), the F. of Esther, and the day most rigorously kept, next to the great day of atonement;—the 9th of the fifth month (Ab), the anniversary of the destruction of the first temple by Nebuchadnezzar, and of the second by Titus. That the people had at all times been prone to attach great importance to the use of this penance as a visible sign of outward contrition, is clear from that ordinance of the Mosaic law which puts into the hands of the head of a family the power of confining self imposed vows of abstinence within due limits. The community loved to express their penitence for sin, or their grief on the death of great men, by occasional fastings. They were also considered an efficient means of averting the divine wrath, of insuring victory over an enemy, or of bringing down rain from heaven. Besides, fasting was not unfrequently resorted to by those who wished to free their minds from all hindrances to meditation, as in the forty days of Moses (Exod. xxxiv. 28), or the F. of Daniel (Daniel, x. 2 and 3). This F. of contemplation, as it might be called, seems also to have been the model imitated by the cabalists, some of whom are known to have fasted from Sabbath to Sabbath. In later times, when, after the destruction of the temple, sacrifices had ceased, fasting, as causing a decrease in the flesh and fat of the individual, was considered to be in some degree a substitute for the animal which had formerly been offered up by the priest. From a means to repentance and inward purification, which purpose alone it had been originally intended to serve, it became an end and a virtue in itself; an abuse, indeed, neither unknown nor undenounced even in the days of the prophets. If we add to this the endless chain of dire calamities and ever-renewed persecutions of which the Jews have been the victims for many a long century, the ever-increasing number of their fasts commemorative of deaths and tribulations will be far from surprising. Most of these, however, which were superadded from time to time, soon fell into oblivion. Over and above the six already mentioned, but few entire days are now observed by the orthodox, and these merely of a local character. Fasting, with the Jews, always implies entire abstinence, and lasts, except on the day of atonement and the 9th of Ab—when the sunset of the previous evening is the sign for its commencement—from the break of the day to the appearance of the first three stars. Sackcloth and ashes, the garb of the penitent in ancient times, are no longer worn; but as the special holiness of the day of atonement is celebrated by various solemnities (see *FESTIVALS*), so the deepest mourning over the loss of temple and country is visibly expressed by many ceremonies in the Jewish synagogues and homes on the 9th of Ab. On that day also, to add the individual to the national sorrow, the cemeteries are generally visited. Of several half-days of fasting that have survived, we will mention the first two Mondays and the first Thursday in the second month (Iyar) and in the eighth month (Cheshwan), (*sheni vachamishi vesheni*), in celebration of the two meeting-points of summer and winter; as also, several days before the new-year or day of judgment, and before the day of atonement. The individual is bound to celebrate by fasting the anniversary of the death of his parents, his own wedding-day until the performance of the marriage-ceremony, and the birth of his first-born male child (up to its thirteenth year—when the duty falls upon the latter himself), on the day preceeding the Pesach (Pasha)—in commemoration of the sparing of the Israelite first-born in Egypt. For the several hours' fasts on the two new-years' days, and on the first six days of the feast of tabernacles, we refer likewise to *FESTIVALS*, and we will only add in conclusion, that the Sabbath causes the postponement of any F.—that of the day of atonement only excepted—which may happen to be coincident with it; and that children—girls up to their twelfth, boys to their thirteenth year—pregnant women, and the sick, are exempted from the observance.

In the time of Christ, fasting, as we have seen, was held in high estimation. The Mondays and Thursdays—the market-days, on which the judges sat, and the law was read in the synagogues—were especially set aside for this purpose by the Pharisees. The Essenes fasted even more frequently. The Sadducees alone took exception to this rite, and were therefore considered ungodly. Christ himself neither approved nor disapproved of the custom, but, as in all matters of ceremony, allowed his disciples, Jews and Gentiles, to act according or contrary to their old habits. He is distinctly against such a *commandment*, and even excuses those who did not fast. His own abstinence from food for forty days was like that of Moses, entirely an individual act; and against a voluntary and limited imitation of such abstinence, to which the spirit might move a man, no objection whatever was to be taken.* During the first centuries of Christianity, these voluntary fasts were frequent enough; the new converts adhering in most cases to their old rite, and only taking care to change the days, which had been days of abstinence in their former religions, for others. Besides, they were considered a befitting preparation for holy acts and feasts, for ordination and baptism. The time mostly celebrated annually in common by all were the 40 hours from Friday afternoon to Sunday morning, during which time Christ lay in the sepulcher. But not before the end of the 2d c. was anything like an ordinance promulgated with respect to fasting in the new religion. It was first Montanus who, as the Paraclete, introduced, among other laws of excessive severity and rigor, fasting, as an inhibition upon the faithful. The Wednesdays and Fridays as the days when Christ was taken prisoner and crucified, were made days of strictest abstinence from all food; while on the other days of the week, dried, uncooked victuals only were allowed. Asceticism and monachism had their share in the gradual development of the doctrine of the necessity of mortifying the flesh, and as a natural consequence, in the growth and diffusion of the custom of fasting. Yet, in the first six centuries, the difference in the various Christian communities was not greater in any other doctrine or ceremony than in this. Bishops and councils, however, gradually fixed the times and seasons for the whole of Christendom. The 40 hours had gradually become 40 days, called the Quadragesima; and the council of Orleans, in 541, made it binding upon every Christian not to eat any meat during this time, save only on the Sundays.† The eighth council at Toledo, in the 7th c., declared those who ate meat during Lent, sinners unworthy to partake in the resurrection. From the 8th c. to the 11th, when a gradual reaction set in, the laws of fasting and the punishments awarded to the transgressors became stricter and stricter; interdict and excommunication were among the penalties. By degrees they had become so numerous and different in kind, that they were divided into—1. *Jejunium generale* (a fast binding for all); 2. *Consuetudinarium* (local fast, etc.); 3. *Penitentiale* (atonement for all transgressions); 4. *Votivum* (consequent upon a vow); 5. *Voluntare* (for the better carrying out of an undertaking). These, again, were kept either as—1. *Jejunium naturale* (an entire abstinence from food or drink, especially in preparation for the reception of the Eucharist); 2. *Abstinencia* (certain food only being allowed, but several times a day); 3. *Jejunium cum abstinencia* (the same food, but which must be taken once a day only); and 4. *Jejunium sine abstinencia* (all kinds of food, but only once a day). The food prohibited on partial fast-days included, during certain periods, not only the flesh of quadrupeds, fowl, and fish, but also the “*lacticia*”—i.e., all that comes from quadruped and bird, as butter, eggs, milk, etc. We cannot here enter into detail; the discrepancies and differences of opinion with respect to the times and modes of fasting, or to the food prohibited, being, even among successive popes and contemporary bishops and elders of the church so numerous, and involved in such obscurities, that the church historians themselves shrink from enumerating them. Suffice it to say, that they gradually developed in the Roman church into—1. Weekly fasts, of which Friday, as the day of the crucifixion, seems to have been early and generally observed. To this was added the Wednesday, as the day on which the death of Christ was resolved upon. These two days received the name of stations; a term borrowed from the *stationes* of the Roman soldiers, in accordance with the views held by the ascetics and monks, that they were

* Roman Catholics, however, maintain that all the words of our Lord, which to Protestants appear to disavow the obligation of fasting, are directed exclusively against the ostentatious and self-reliant fasts of the Pharisees. They even understand the language which he used in condemning the practice of the Pharisee fasters, as containing a direct exhortation to his own disciples—not that they should abstain from fasting—that they should fast with suitable dispositions. They hold, moreover, that in exempting his disciples from fasting, he had regard only to the actual time of his own presence among them. It was incongruous, he said, that the children of the marriage should fast as long as the bridegroom was with them; but, he added, “the days will come when the bridegroom shall be taken away from them; and then they shall fast in those days” (Mark iii. 20; Matt. ix. 15). Hence they infer, that from the time of our Lord’s ascension the practice of fasting became obligatory on his disciples, the temporary cause of the exemption hitherto existing having ceased.

† It is only just to add, however, that here again Catholics dissent strongly from the Protestant view of this history. They admit that the followers of Montanus did introduce greater rigor and frequency into their fasts; but they deny that before the time of Montanus the practice of fasting was not fully recognized in the Christian church, and regarded as strictly obligatory. The very earliest allusions to the 40 days’ F. of Lent (*tessarakosté*) regard it as an established and recognized institution. The very first fathers who allude to it, speak of it as “handed down and observed by the church,” and so far its origin from being ascribable to the influence of Montanism, that, on the contrary, the earliest relaxations which the church admitted were a reaction against the excessive and intolerable rigor of that fanatical sect.

the warriors of Christ. At a synod in Spain in the beginning of the 4th c., the Saturday was superadded, but this innovation met with great opposition, especially in the east, where Jewish notions regarding the Sabbath had obtained a more permanent recognition. 2. Vigils, originally night-services observed by the first Christians on the eve of Sundays and festivals, partly in imitation of the Jewish custom of celebrating the entrance of the Sabbath and of festivals on the evening of the previous day, and partly in fear of the danger to which a service in the day-time would have exposed the early converts. Although these night-services became unnecessary in the course of time, they were still continued up to the 4th c., when, owing to the abuses to which they led, they were abolished, or rather transformed into fast-days, kept on the eve of great festivals in honor of Christ, Mary, saints, and apostles. 3. The great or 40 days' F. (Quadragesimal F.), the most important and most rigorously enforced of all. The 40 hours of F., in commemoration of the 40 hours during which Christ's body lay in the tomb, gradually expanded to 36, or rather 40 days, as mentioned before, in pious allusion to the 40 days of Moses, Elijah, Christ, the 40 years' sojourn in the desert, or the 40 camps—all considered typical—and the fasting became severer the nearer Passion-week itself approached, in which many other signs of mourning and contrition were generally exhibited. 4. The Quatember fasts on the Wednesdays, Fridays, and Saturdays in one week of each season, in imitation of the four Jewish fasts in the 4th, 5th, 7th, and 10th month.—There were still many other fasts, such as those of ordination, etc., but as they had only a temporary existence, we cannot treat of them here. Nor can we enter into the various dispensations granted by the church, or the special pastoral letters generally issued before Quadragesima, nor into the variations in the observance of fasts and fasting in our own days; we can only add, that they have in a great measure lost their former severity, and that only partial abstinence is the rule in all cases. The opinion held by the church in former days, that fasting is meritorious, and conducive to the salvation of the soul, has undergone no change.

With respect to the Greek church, we have to observe that fasting was and is kept with much greater severity, the non-observance of it being the least venial of sins. The days here extend over almost three quarters of the year. The principal ones are the Wednesday and Friday—with a few exceptions—throughout the whole year; the great Easter F. lasting 48 days; that of Christmas, 39 days; that in honor of the Virgin, 14 days; and that of the Apostles, beginning on Monday after Trinity, and extending to the 29th of June. Besides those smaller fasts of preparation, which correspond to the vigils of the Roman church, they have many more occasional fasts, which we, however, must omit here.

The church of England considers fasting a praiseworthy, but by no means obligatory custom. According to Hook's *Church Dictionary*, the distinction between the Protestant and the Roman Catholic view of fasting consists in this, that the Roman catholic regards the use of fasting as an imperative means of grace, the Protestant only as a useful exercise preparatory for the means of grace. In proof how much the church of England has left the question of fasting to the conscience and discretion of her members, it may be observed that she has neither defined the mode or degree of fasting, nor anywhere given a positive command to fast. It has been remarked that no bishop of the church of England has in an episcopal charge laid down fasting as a positive requirement. The days named by the English church as seasons of fasting or abstinence, are the forty days of Lent (q.v.), including Ash Wednesday and Good-Friday; the Ember (q.v.) days; the three Rogation (q.v.) days, and all the Fridays in the year (except Christmas-day), and the eves or vigils of certain festivals.

A few words remain to be said of the Mohammedan fasts. Islam, as an offspring of Judaism and Christianity, adopted this custom, with many others, from both churches. During the whole month of Ramadan, in which the prophet brought the Koran from heaven, eating, drinking, smoking, smelling perfumes, etc., are strictly forbidden from daybreak till sunset; for the intervening nights, however, all these restrictions are removed. There are, besides, many voluntary fasts, expiatory like the 10th of Moharram, corresponding to the Jewish day of atonement, or for the averting of the Divine wrath in sudden calamities, or as an indemnification for the omission of certain pious acts, as the pilgrimage, etc. See JEWS, MOHAMMEDANISM, MONACHISM.

Besides the *Bible*, *Schulchan Aruch*, *Koran*, and the fathers generally, we refer to the following authorities on this subject: Bingham, *Orig.*, vol. ix. 1, 21; Fabricius, *Bibliogr. Antiquaria*, c. 11; J. A. Muratori, *De Quatuor Temporum Jejuniis*, etc.; J. Dalleus, *De Jejuniis et Quadragesima*, 1654; Schöne's *Geschichtsforschungen*, Th. 1; *Briefe über d. Gottesd. d. morgenl. Kirche*, von Dr. E. v. Muralt (Leip. 1838); Siegel, *Altchristl. Alterthümer*; Dassel, *De Jure Temp. Quadrages.*, 1617; Walch, *De Jejuniis Quadragesimali* (Jenæ, 1727); Homborg, *De Quadragesima Veterum Christianorum et ritibus in ea quondam usitatis diss. qua etiam de recentior. Papist., Græc., Russ., Syrian., Georgian., Maronit., Jacobit., etc., disseritur* (Helmst., 1677).

Fasting, or deprivation of food, is, in a physiological sense, a state inconsistent with the continuance of life in most warm-blooded animals more than a few weeks. If water is not supplied, the period is much shorter, being in man commonly not more than a very few days, or at most a week. Persons have been found in coal-pits and mines, and in other situations where access to food has been impossible, but where water could

be had, as long as six weeks after their seclusion, still alive, though of course in a very feeble condition; and a very small daily allowance of food has supported life longer than this, as in some cases of shipwreck, and other accidents at sea. Cases of alleged fasting, longer than this, as in the notorious woman of Tutbury, are certainly in most instances due to imposture. The insane would appear, in some instances, to bear fasting better than the healthy. Hibernating animals (see HIBERNATION) are capable of sustaining the want of food for an apparently indefinite period of weeks during the winter sleep; but no warm-blooded animal can endure fasting in anything like the same degree as the reptiles, in many of which, indeed, the natural state of existence is one of long intervals between the times of taking food, and in which the vital change of texture is remarkably slow. Thus, the remarkable amphibious animal, the *Proteus anguinus*, has been known to live for years without food, and the same is true of salamanders, tortoises, and even goldfishes. In fasting, the body gradually emaciates, most of the secretions are arrested, or greatly diminished, and at last the animal heat falls rapidly in all parts of the body. In attempting the recovery of persons reduced by fasting, food must be given in very small quantities at a time, and of the most nourishing and digestible quality; stimulants should be either withheld, or very cautiously administered. The most important point, next to the regulation of the food, and sometimes even before food is given at all, is the removal of the torpor and chill of the body by gradually applied heat, with friction of the limbs. See Tiedemann's *Physiology*; Burdach's *Physiology*; Chossat, *Recherches sur l'Inanition*.

FASTEN'S EVE. See SHROVETIDE.

FASTI. *Fas*, in Latin, signifies divine law, and *fastus*, anything in accordance with divine law. Hence the *dies fasti*, or lawful days, among the Romans, were the days on which it was lawful to transact business before the prætor. But the sacred books, in which the lawful days of the year were marked, were themselves denominated *fasti*, and the term was employed, in an extended sense, to signify various kinds of registers, which have been often confounded with each other. These registers fall into two principal divisions—the F. Sacri or Kalendares, and the F. Annales or Historici.

1. *Fasti Kalendares*, or calendars of the year, were kept exclusively by the priests for about four centuries and a half after the building of the city. The appearance of the new moon was proclaimed by a pontifex, who at the same time announced to the people the time which would intervene between the calends and nones. See CALENDs, also CALENDAR. On the nones, the country-people assembled for the purpose of learning from the Rex Sacrorum the various festivals of the month, and the days on which they would fall. In the same way, those who intended to go to law, learned on what days it would be right (*fas*) to do so. The mystery with which this lore was surrounded, for purposes of power and profit, by the favored class, was dispelled by Cn. Flavius, the scribe of Appius Cæcus, who surreptitiously copied from the pontifical book the requisite information, and published it to the people in the forum. From this, time-tables (*fastæ*) became common, very much resembling modern almanacs. They contained the days and months of the year, the nones, ides, lawful and unlawful days, etc.; astronomical observations on the rising and setting of the fixed stars, the commencement of the seasons, brief notices concerning the introduction and signification of certain rites, the dedication of temples, the dates of victories, disasters, and the like. In later times, the exploits and honors of the imperial family were duly entered in the calendar. The celebrated *Fasti* of Ovid is a sort of poetical companion to the calendar, as published by Julius Cæsar, who remodeled the Roman year.

Several very curious specimens of F. on stone and marble have been discovered, of which one of the most remarkable is the Kalendarium Prænestinum, which stood in the lower part of the forum of Præneste, described by Suetonius. Of these ancient F., eleven are enumerated by Foggini, a learned Italian antiquary. One of the most interesting is a rural almanac, known as the Kalendarium Rusticum Farnesianum. It is cut on four sides of a cube, each side of which is divided into three columns, each column embracing a month. The various agricultural operations to be performed in each month are given on this curious relic, in addition to the ordinary information contained in these calendars. In the month of May, for example, the rustic is told that his corn must be weeded, his sheep shorn, his wool washed, etc.

2. *Fasti Annales* or *Historici* were chronicles, containing the names of the consuls and other magistrates of the year, and an enumeration of the most remarkable events in the history of Rome, noted down opposite the days on which they occurred. From its application to these chronicles, the word F. came to be used by the poets as synonymous with historical records. A very interesting specimen of F. of this class was discovered in the forum at Rome in 1547. The fragments into which it had been broken were collected and arranged by the cardinal Alexander Farnese, and placed in the capitol, where they may still be seen, together with some additional portions which were discovered in 1817 and 1818. See Smith's *Dictionary of Greek and Roman Antiquities*, voce "Fasti," and also the article on "Calendar" (Roman) in the same work.

FAST AND LOOSE is the name of a cheating game, also called *pricking at the belt*, which appears to have been much practiced by the gypsies in the time of Shakespeare. The following is a description: "A leathern belt is made up into a number of intricate

folds, and placed edgewise upon a table. One of the folds is made to resemble the middle of a girdle, so that whoever shall thrust a skewer into it would think he held it fast to the table; whereas, when he has so done, the person with whom he plays may take hold of both ends, and draw it away." The game is still practised at fairs, races, and similar meetings under the name of *prick the garter*.

FASTOLF, SIR JOHN, was b. about 1378 at Caistor, near Yarmouth, and "exercised," says Caxton, "the wars in the royaume of France and other countries for 40 years enduring." He distinguished himself at Agincourt (1415), and still more at the "battle of the Herrings" (1429), so called, because while conveying supplies to the English besiegers of Orleans, he formed a sort of *laager* of herring-barrels, and with his archers beat off a whole French army. Later in the same year he was less successful against Joan of Arc, and at Patay, according to Monstrelet, whom Shakespeare follows, displayed such cowardice that the duke of Norfolk stripped him of his Garter. This, however, is very questionable; he rather seems to have retained all his honors till in 1440 he went home to Norfolk, and in 1441 he was granted a pension of £20 "for notable and praiseworthy service and good counsel." His Norfolk life is mirrored faithfully in the *Paston Letters*, where we see him adding to his broad possessions, heaping up riches, building a huge new castle at Caistor—a hard old man, yet not without love of learning and the church. He d. Nov. 5, 1459. His identification with "Sir John Falstaff" is at least incomplete, for Oldcastle (q.v.) was certainly Shakespeare's prototype.

FASTNET LIGHTHOUSE. This celebrated lighthouse is located on a rock four miles s.w. of Cape Clear (q.v.), and has a revolving light one hundred and forty feet above high water, which can be seen a distance of eighteen miles.

FATAL CHILDREN were in early times those children who were to bring evil to their parents, such as Œdipus, Perseus, etc. In mediæval days, the term referred especially to children whose mothers died at their birth. Such an event was supposed to be an augury of the future fame but early death of the child. Volung in the Teutonic myth and Tristram in the Arthurian romance were such children.

FATA MORGA'NA is a striking kind of mirage observed in the strait of Messina. A spectator on the shore sees images of men, houses, ships, etc., sometimes in the water, sometimes in the air, the same object having frequently two images, one inverted. See **MIRAGE**.

FATE—FATALISM, express a conception which has more or less prevailed in all religions. The words are derived from the Lat. *fatum*, which has primarily a passive signification, denoting something uttered—a decree or ordinance. The Greeks expressed the same thought by *eimarmenê*. *Moira*, again, was the active personification of the idea—the goddess of fate or destiny. It represented, in the Greek mythology, the final monotheistic element—the vague unity binding together and dominating over the crowd of Olympian deities. In Homer, *Moira* has a double meaning, appearing sometimes as superior to the will of Zeus, and sometimes as inferior to this will. With the course of Grecian thought, the conception of fate became more spiritualized. In Æschylus it is an inexorable destiny; in Sophocles and Plato, it is more of a free and ordering will. In the latter forms of Greco-Roman speculation, again, it undergoes various modifications. With the Epicureans, it seems identical with chance (*tuche*); with the Stoics, it is the very opposite of this. In the one case, the absolute is a mere blind fatality; in the other case, it is an imminent necessity of reason, governing with iron sway the apparently accidental phenomena of life.

In the two great religions of modern times, Christianity and Mohammedanism, the same conception is found in various forms. In the latter, the highest is conceived as an arbitrary and inexorable law, swallowing up every lower law of activity, and permitting no scope to freedom of development in human nature. In Christianity and the modern speculation which it has colored, it shows itself less broadly in the well-known doctrines of predestination and of philosophical necessity. In the predestination theory of Augustine, Calvin, and many others, the old fatalistic doctrine is repudiated; the recognition of a free determining element in the divine will, separates their idea of it altogether from that of a mere blind destiny; but the influence of the mode of thought out of which the old idea sprung, appears in the manner in which the divine decrees are sometimes spoken of as inexorably overbearing human freedom. In the doctrine of philosophical necessity promulgated by Leibnitz, Edwards, and in a somewhat different form by modern positivism, the same idea emerges under the name of inevitable sequence—of an invariable connection linking together all phenomena material and mental. An immutable law is declared to pervade and harmonize all existence. This is a much higher conception, but it is not difficult to see how easily it may pass into the old pagan doctrine of fate.

The doctrines of predestination and of philosophical necessity have been supposed mutually to support each other; in reality, however, they are very different doctrines. The one starts from the dominating conception of the divine will as overruling all things, and approaches fatalism by ascribing in certain cases such an absorbing energy to this will as to leave no power of free action to any other will. It conceives of everything as swallowed up in the single omnipotence of the divine. It is *pantheistic*. The

other starts from the dominating conception of law in nature, and approaches fatalism by investing this law with an immutable and self-subsistent character. It looks at all existence as a mere undeviating routine of development, and tends in exact opposition to the other doctrine, to shut out the divine behind the screen of the natural. It is *atheistic*. It is, of course, merely the tendency of the respective speculations that is thus characterized.

The conception of fate springs irresistibly from man's consciousness of the transcending greatness of what is outside and above his own feeble existence—of the objective power that incloses and molds his own subjective activity. As such, it will never wholly disappear from human speculation, however endlessly modified it may be.

FATES. See **PARCÆ**.

FATHER. See **PARENT AND CHILD, FAMILY, PATRIA POTESTAS.**

FATHER-LASHER, *Cottus bubalis*, a very common fish on the British coasts, the most spiny of the British species of *cottus* (q.v.), and particularly armed with strong spines on the back of the head—which is large—and on the gill-covers. When touched, it distends its gill-covers, sets out its spines, and assumes a very threatening appearance. Its general aspect is indeed forbidding, and even the little boys who angle from the rocks and pier-heads are usually averse to touch it, although it is said to be wholesome and agreeable food. It is of a brown color above, whitish beneath, curiously marbled and spotted, the fins marbled black and white. In Scotland, it bears the name of *lucky proach*.

FATHERS OF THE CHURCH (*patres ecclesiastici*), certain early writers of the Christian church. The term *abba*, Græcized *abbas* (father), in use among the Talmudists as a synonym of *rabbi* (my master), and constituting, according to Maimonides, the third or lowest honorary title of a doctor of the divine law, was in the first centuries of Christianity applied indiscriminately to all theological writers who were distinguished by their learning, genius, or piety. Gradually, however, the word *father*, or, more fully, *father of the church*, was confined to those teachers whose writings were considered pre-eminently orthodox, and who might be looked upon as the *progenitors*, as it were, of certain dogmas, upon the development of which they had exercised a more or less direct influence; while those writers who diverged into the fields of heretical opinion were called *scriptores ecclesiastici* (church-writers). Out of the number of the former, some few master-minds, to whom the church owed a still greater tribute, were again singled out as *doctores ecclesiæ* (doctors of the church), which title of pre-eminence, however, is bestowed on many writers who lived subsequently to the time of the fathers, in consideration of their "purer and more excellent doctrine" (Benedict, xiv., *Bulla, Milît. Eccles.*).

The temporal limits within which the fathers are to be confined, as well as their proper share of authority in matters of faith, have long been points of grave discussion. While some include the fathers of the 1st c., generally called the apostolical fathers, on account of their being the contemporaries or disciples of Christ and the apostles, they are excluded by others; again, by some, the 7th c. is made the closing period, while others carry the list down to the 12th, or even the 13th century.

With respect to the authority of the fathers, some, like Fredegis, held their words to be as sacred as those of the prophets and sacred writers; while others, like Alphonso di Castro, Melelius Cano, and cardinal Cajetan, ridiculed the notion that Symmachus should be made equal to St. Paul, or Didymus to St. John the evangelist. Others, again, like Pope Gregory and the majority of writers, took the middle course of regarding them not as infallible, much less as prophets and apostles, but held that, when in matters of faith the most perfect and unswerving unanimity reigns among them, then only, the Holy Ghost is to be considered to speak through them. See **RULE OF FAITH; INFALLIBILITY**.

Immense as is the range and variety of their writings, ascetic, apologetic, polemical, exegetical, moral, historical, or dogmatical, so also is the diversity of their individual value. Nothing can be further from historical justice than either the wholesale laudation or condemnation of these writers as a body; but whatever stand we may take, we cannot but see that they are of the utmost moment. Stretching as they do over the entire extent of that period which forms the turning-point between the antique and modern world, they faithfully and often unconsciously portray that awful change, of which they were in no small degree the instruments—the gradual wane of old faiths, and of an old civilization, and the slow and struggling rise of that which was to replace them; while they preserve the most minute and trifling details with the same accuracy as the most momentous event, as each happened to bear upon their subject. The philosopher, the historian, the antiquary, each and all will find their writings, as a whole, to contain an inexhaustible fund of instruction. Of no less interest, perhaps, are their works in relation to the writers individually. These, issuing from all parts of the then known world, from all ranks, all creeds, could not but impress the stamp of their nationality and callings, besides that of their youth or age, vigor or feebleness, upon their writing—Jew, Greek, Roman, African, Spaniard—orator, poet, lawyer, statesman, priest, they all bring with them that which was their own before they

embraced the new faith: their dialectic power, their fantastic poetry, their graceful speech, their stern austerity. What Greek subtlety did theoretically for the development of dogma in Origen and Athanasius, that Roman thoroughness did practically for the erection of the hierarchy in Leo the Great and Gregory III.; while from Egypt came asceticism and monachism, the ascendancy of spiritualism over sensualism is owing to those who came from the northern coast of Africa. How far Platonism, and especially Neoplatonism, Aristotle, and Greek philosophy generally, are found developed in these works, and infused into the new faith by the former teachers of the academies themselves, who mostly retained their old philosophical garb, upon this, as well as upon many other points, we must forbear to enlarge.

We will now proceed to take a brief survey of these writers—referring for further information to the special articles on the more eminent among them. According to the now generally adopted method of dating them from the 1st to the 7th c., they are divided into two distinct periods, the first of which goes down to the council of Nicæa, 325 A.D. Of those who head the list, the apostolic fathers—so called from their supposed connection with Christ and the apostles—very little need be said, as their writings, which are mostly of an ascetical character, have come down to us in a corrupt and mutilated state, and as the writers themselves owe their chief celebrity to the times in which they happened to live. We have here Barnabas, the son of Teostes, and the companion of St. Paul (Acts ix. 27; xii. 25); Clement, supposed to have been the third bishop of Rome; and the Clement mentioned by St. Paul (Philipp. iv. 3); Hermas, identical perhaps with the Hermas of St. Paul's Epistle to the Romans (xvi. 14); Ignatius, bishop of Antioch; Polycarp, bishop of Smyrna; Papias; Dionysius the Areopagite, etc. Next follow the apologists, or those fathers whose chief aim was the defense of the new faith against the Roman state, and non-Christian authors, and who were the first to make their scientific culture, and more especially the Platonic philosophy, subservient to Christianity, for this purpose: Quadratus the "evangelist," a traveling missionary; Aristides, an Athenian philosopher; Justin Martyr, the well-known author of the two Apologies and the Dialogue with Trypho (or rather Tarphon); Tatian of Assyria, who, having examined the different forms of worship, as well as the systems of philosophy prevalent in his time, felt satisfied with none but Christianity, and became a disciple of Justin, and a vindicator of the philosophy of the barbarians; Athenagoras, who addressed his apology to the emperor Marcus Aurelius, and his son Commodus, and wrote a Defense of the Doctrine of the Resurrection; Theophilus, bishop of Antioch; Miltiades, etc. Next come the church fathers of Asia Minor, men of more practical and peaceful tendencies: Hegesippus, perhaps an Ebionite; Irenæus, bishop of Lyons and Vienna, who wrote a refutation of the Gnostic system; Hippolytus, his disciple, of unknown birthplace and renowned name. In the North African church, the development of which is of the utmost moment, inasmuch as its language, dogmas, and laws were adopted by the greater part of the Christian world in the west, we find Tertullian of Carthage, the rhetorician and advocate, a man of profound mind and vast influence; Cyprian, the author of the *Testimonies* in favor of Christ; Commodian, the writer of the *Rules of Living*; and Arnobius, a rhetorician of Sicca, in Numidia. The first comparatively barren, though otherwise highly important church, is the Roman. The pre-eminently practical Roman mind looked more to the outward growth and well-being of the church than to literary excellence, and thus we have only two distinguished authors to be noticed here—the presbyter Caius, known as an opponent of the Montanists; and the presbyter Novatian, who wrote a treatise on the Jewish laws respecting food. The church which, more than any other, endeavored to combine speculation with faith, and which gradually became, through its high degree of culture and erudition, the very center of Christianity, is the Alexandrian. And here we have Pantenus; Clement the Alexandrine, chiefly known by his *Stromata* or *Elements of the Gnosis*; Origen, called Adamantinus, the eminent Neoplatonist, born 185 A.D., in Alexandria, one of the most influential writers of the whole Christian church; Hercules, with his disciple Dionysius, a liberal and moderate man; Gregory, the worker of miracles; Pamphilus and Julius Africanus, the first Christian chorographer.

In the second period, which dates from the Nicæan council, and comes down to Gregory II., 604 A.D., a period altogether superior, on account of the great number of intellectual and erudite men who devoted their lives and labors to the church, we have to distinguish the Greek from the Latin fathers. Among the former, we have again to draw a line between those of the Alexandrine school—like Eusebius Pamphili, the Herodotus of the church; Athanasius, the father of orthodoxy; Basil the Great, doctor ecclesiæ, and his brother Gregory of Nyssa; Gregory of Nazianzen, called the theologian, by way of eminence; Didymus; and Cyrillus, some time patriarch of Alexandria, the chief prosecutor of Nestorius—and those of the Antiochian school, where we find Ephraem Syrus, "the prophet of the Syrians;" Cyril of Jerusalem, the converted Arian; John Chrysostom, of brilliant eloquence; Diodorus, bishop of Tarsus, one of the chief founders of the Antiochian school; and Theodore, bishop of Cyrus. Besides these, we find, of Greek fathers who belonged to neither school—Epiphanius, the violent adversary of Origen; Socrates Scholasticus, the continuator of Eusebius's *Ecclesiastical History*; Philostorgius, an Arian church historian; Logomenus; Evagrius; Macarius the elder, chiefly known through his miracles and combats with the devil; Procopius of

Gaza, the rhetorician; and Joannes Scholasticus, famous through his collections of canonical law. Among the Latins, we have to enumerate first the African fathers: Fabius Victorinus; Augustine of Tagaste in Numidia, the greatest dogmatist of the western church; Pope Gelasius I. (492-96), who finally fixed the canon of the Bible for the Roman church; and the bishops Fulgentius, Junilius, and Facundus. Of Spaniards, we have Prudentius the poet; Paulus Orosius, whom Augustine used as his messenger to the east in his controversies with Pelagius. Of Gauls there are Hilarius Pictaviensis, bishop of Poitiers about 350, the Athanasius of the west; Paulinus of Nola; Sulpitius Severus, friend of Martin of Tours; Vincent of Lerins, once a soldier, who wrote under the name of Peregrinus; Sidonius Apollinaris, bishop of Clermont; Gennadius, the author of an ecclesiastical literary history; Ennodius from Arles, who exerted himself to unite the eastern and the western church; and Gregorius Turonensis, who wrote *Historia Ecclesiastica Francorum*, the basis of Frankish history. From other countries we have Sedulius, an Irishman; Joannes Cassianus, a Scythian; and Mercator, of unknown birthplace. We conclude with the Italians themselves: Lactantius Firmianus, the Christian Cicero; Julius Firmisius Maternus of Sicily; Ambrose, metropolitane of Milan, who raised his see to such a power that it dared to resist Rome herself up to the 12th c.; Rufinus of Aquileia, defender of Origen against the charge of heresy brought against him in the west; Eusebius Hieronymus, undoubtedly the most learned of all the Latin fathers, and who mastered also the Greek and Hebrew languages, collected in Palestine the most valuable notes for the elucidation of the Scriptures, and also corrected the Latin edition of the Vulgate; Pope Leo I.; Boethius; Aurelius Cassiodorus, whose *Historia Tripartita*, in twelve books, served for a thousand years as a compendium of ecclesiastical history; the two poets, Arator and Venantius Fortunatus; and Pope Gregory I. (590-604), is regarded by Protestants as having first given the western church its peculiarly Roman Catholic stamp by developing the idea of the eucharist into a theophany, and making it the center of the worship. His works, especially his letters, are invaluable for the study of his own times, especially for the history of the conversion of the west.

On the MSS. of the fathers, we refer to *Petri Lambecii Commentarii de Bibliotheca Cesarea Vindobonensi*. The editions of the works of the fathers are of two classes—those of the individual fathers, whose writings are the most voluminous and of highest dogmatical importance, and the general patristic collections, which comprise the writings of the less voluminous or minor fathers. In the former class, the first place, beyond all dispute, belongs to the celebrated Benedictine editions, by the members of the great Maurist congregation of the French Benedictine order (see BENEDICTINES), of which community the task of editing the fathers came to be considered as the recognized work. The Benedictine editions of the greater fathers, with the exception of two or three, still maintain the very highest place in the estimation of the learned. Of the collections of the works of the fathers, the most important are those of La Bigne, Galland, Rössler, Walch, Zimmerman, and Migne. Reference may also be made to cardinal Mai's *Bibliotheca Patrum*, *Spicilegium Romanum*, and *Classici Auctores*, and to the *Spicilegium Solesmense* of the Benedictines of Solesme. Translations of the principal fathers are numerous. The chief works upon the more important fathers are noted under their several names.

FATHIPUR, or **FUTTEHPUR**, a district in the Allahabad division of the N. W. Provinces of British India; in the s.e. corner of the tract between the Ganges and the Jumna; 1633 sq. m.; pop. '91, 699,000.

FATHOM, a measure of six feet, principally used in reference to marine soundings, and in mines. Originally, a fathom was taken as the width to which the two outstretched arms extended.

FATIGUE UNIFORM or **DRESS**, the working-dress of soldiers, worn by them when engaged in fatigue duty, i.e. any duty which entails labor other than that of carrying arms. Fatigue uniform is distinguished from dress uniform, which is worn on ceremonial occasions. A part of the fatigue dress is a small light cap, called a fatigue cap.

FATIMIDES, or **FATIMITES**, the name of an Arabian dynasty which reigned for nearly two centuries over Egypt. Its founder was Mahadi-Obaidallah, who flourished from 910 to 934 A.D. He asserted that he was descended from Fatima, the daughter of the prophet, and Ismael, a grandson of Ali. He thus won over to his side all the adherents of the widely diffused Ismaelites, an extravagantly schismatic sect of Mohammedans in Africa, and overthrew the race of the Aglabides, who ruled at Tunis. His successor extended his dominion as far as Fez, and his descendant Moëzz, in the year 970, conquered Egypt, expelled the reigning family, removed his court thither, founded Cairo, assumed the title of caliph, thus proclaiming himself the lawful successor of the prophet, and subdued Syria and Palestine. After the death of Moëzz, the F. maintained their high position for some time; but gradually degenerated, and resigned all the cares of government into the hands of their viziers. Their power now rapidly declined, and their vast territories melted away. In religious matters, the F., because they were raised to power by the followers of Ali, took upon themselves the protection of the Shiite sect, and the establishment of the Ismaelitic doctrines. Between the years 1002-21, the caliph Hakem-Biamr-Allah persecuted the orthodox Mohammedans or Sunnites, as

well as Jews and Christians. He founded an academy at Cairo, and endowed it largely, but connected with it a secret society for the diffusion of Ismaelitic opinions. In the first stages, the novice was shown the untenable nature of the precepts of the Koran; in the sixth, the advanced student found that religious legislation must give way to the claims of philosophy; in the seventh, a mystic pantheism was proved to be the true philosophy; and finally, in the ninth, the initiated discovered that he was not required to believe anything, and might do whatever he pleased. His system, with considerable modifications, found a home among that peculiar people the Druses (q.v.). After the death of Adhid, the last of the F., in 1171, the founder of the dynasty of the Ayubides, Salâh-ed-dîn (Saladin), took possession of Egypt.

FAT LUTE is the term applied to a composition of linseed-oil and pipe-clay. See **LUTE**.

FATS are those oily substances which are solid at ordinary temperature. They do not differ essentially from the liquid oils. See **OILS**.

FATS, ANIMAL. There is considerable difference of opinion amongst chemists regarding the exact nature of the fats occurring in the animal body. According to most chemists, they are composed of an admixture of three separate fats—margarine, stearine, and oleine, of which the two former are solid, and the latter fluid, at ordinary temperatures. Heintz, who has carefully studied these bodies, declares, however, that margarine is not a simple fat, but a mixture of stearine and palmitine (a solid fat occurring in palm-oil); and he considers human fat to be a mixture of stearine, palmitine, and oleine. For the chemical characters of these substances, we refer to the articles **MARGARIC ACID**; **OLEINE**; **PALMITINE**; and **STEARIC ACID**; and we proceed to the consideration of the physiological relations of the fat.

Fat, usually inclosed in vesicles, is found very extensively in the animal kingdom. It is abundant in many larvæ, and occurs more scantily in most insects. It is met with in the mollusca, and is comparatively abundant in all the divisions of the vertebrata. In most fish, it occurs throughout the body, but is especially abundant in the liver, where it is found in the hepatic cells, and not in its own characteristic vesicles. In reptiles, it chiefly exists in the abdomen. In birds, we especially find it about the peritoneum, and under the skin. In mammals, it is very generally diffused, but the greatest quantity is under the skin, in the omentum, and round the kidneys.

The quantity of fat in the human body varies considerably at different periods of life. In the earlier stages of fetal existence, we find scarcely any fat; in new-born children, there is usually a considerable quantity of this substance deposited under the skin, and the organism continues rich in fat till the age of puberty, when a marked diminution of the substance occurs. It again increases about middle life, and then occasionally occurs in great excess; for example, 3 or 4 in. of fat are not unfrequently found under the skin of the abdomen in corpulent persons.

Extraordinary deposits of fat in some particular part of the body are observed in certain races of men and animals. One of the most remarkable examples of this peculiarity is afforded by the Hottentot women, in whom the fat accumulates in the gluteal region to such an extent as to give a most remarkable prominence to that part of the body; and a somewhat analogous deposit exists in a variety of sheep (*ovis steatopyga*, the fat-buttocked sheep), in which a large mass of fat, sometimes attaining a weight of 40 lbs., is developed on the buttocks, and takes the place of a tail.

The origin of the fat in the animal body must undoubtedly be chiefly referred to the fat taken with the food. It has, however, been proved by the most careful investigations on various animals submitted to the process of fattening, on bees fed with cane-sugar, or with honey containing scarcely any wax, and on the larvæ of the insects inhabiting galls, that the animal, like the vegetable organism, has the power of forming or producing fat, far more fat being found, in these experiments, in the body of the animal, than could be referred to the fat taken in the food. The excess must therefore have been formed either from the non-nitrogenous portion of the food, such as starch and sugar; or from the nitrogenous matters, such as fibrin, albumen, etc. In the case of the bees, it was distinctly proved that the fat was formed from sugar; while in the case of the larvæ of the gall-insect, it was similarly shown that it was produced from the starch which forms the interior of the gall in which the animal lives; and as we have no corresponding evidence of the convertibility of fibrin, albumen, etc., into fat (although such a conversion is by no means improbable), we must for the present regard the non-nitrogenous foods as the chief fat-formers next to fat itself.

The physiological value of the fats is partly due to their physical, and partly to their chemical characters.

The uses of the fat deposited beneath the skin are, first, to protect the body from external shocks by a uniform diffusion of pressure through the whole adipose tissue; and, second, to keep up the heat of the body, by materially checking, through its very slight conducting power, the loss of free heat by radiation. This use of the fat is most clearly seen in some of the lower animals (the seal, whale, etc.), which are exposed to very low temperatures.

Another physical use of fat is to promote the mobility of various organs. Hence, in

cases of extreme emaciation, it always remains in the parts where motion is most essential, as the heart, and the orbit of the eye.

Another of its important physical properties is that of rendering other bodies supple, and diminishing their brittleness. In this point of view, the use of fat is very conspicuous in the bones.

The chief chemical use of the fat is its power of exciting and supporting the animal heat. In the oxidation of the fats in the animal organism, whether the process be gradual or rapid, a large amount of heat must necessarily be liberated; and that they are oxidized, and for the most part reduced to carbonic acid and water, is evident, because they neither appear in any quantity in the excretions, nor, as a general rule, accumulate beyond a certain point in the organism. An accumulation of fat thus serves as a reservoir of combustible matter in time of need. This is especially evident in the case of hibernating mammals, as, for example, hedgehogs, in which an enormous quantity is deposited just before the hibernating period; during this period, it gradually disappears, its carbon being slowly consumed in the respiratory process, and keeping up the animal heat.

Fat is, moreover, one of the most active agents in the metamorphosis of animal matter. Lehmann ascertained that a certain, although a small quantity of fat was indispensable to the complete gastric digestion of nitrogenous food, a fact which is confirmed by the observation that in experiments on artificial digestion, the solution of substances used as food is considerably accelerated by the presence of a little fat. The occurrence of fat in the milk and in the egg, as also in all highly cellular organs (as, for example, the liver), is a clear indication that this substance plays an important part in the process of cell-formation; and no animal cell or cell-yielding plasma has ever been observed in which fat is not a constituent.

An undue accumulation or increased growth of the fatty tissue gives rise to the condition known as obesity (q.v.).

FATTY ACIDS. See OILS.

FATTY DEGENERATION, a pathological term signifying the gradual replacement by fat-globules of the tissues of a living body, impairing and finally destroying them. These globules, though originating in the living tissues and existing among them, have in themselves no element of life; hence when they replace living tissues they are destructive of them. Fatty degeneration must be distinguished from obesity, which is simply excessive deposition of fat between the tissues. The disease, which is not regarded as curable, is of frequent occurrence, and it attacks nearly all the tissues, particularly the muscular and cellular, as in the heart and liver, which organs are often the seats of the disease. The red blood globules and the nerves are probably never attacked by it.

FATUITY, or **DEMENTIA**, consists in the impairment or extinction of certain mental powers, or of all. Esquirol has quaintly but descriptively said that the idiot and imbecile are poor who have never been rich, but that the fatuous or demented are rich who have been made poor. This impoverishment is sometimes so extreme, and the sufferer is so little influenced by consciousness as to lose a knowledge of his own existence; and so little by impressions through the external senses, and by the instincts of the sensory ganglia, as to be equally ignorant of the existence of others. Life is vegetative merely. This deprivation may be partial or complete. It may appear as a weakening of sensibility. This is not the tolerance of powerful or painful impressions, or indifference to such, springing from abstraction or engrossment of the attention, but positive extinction of perception; or it may present the more common form of enfeeblement of intelligence, of memory; of the will, where the patient is apathetic, passive, plastic. The disease may involve the affections and the moral sense, and abrogate the power of decision, and all spontaneity of action and thought. Incoherence in ideas and words may be made to constitute another form, although generally regarded as a characteristic; whether it amounts merely to forgetfulness, or to confusion or irrationality, to inconsecutiveness and inability to express instincts and wishes. Delusions and hallucinations may co-exist with these conditions, but like the real impressions received by this class of the insane, they are feeble, fugacious, and uninfluential. Under all these aspects, the essential element is privation of power; and this is met with as a specific mental disease, arising from obvious causes, unassociated with general alienation, acute in its nature, and rapid in its progress. It is most frequently the disease of youth, of the period of puberty, contemporaneous with growth, with debilitating and exhaustive processes, and depending, in all probability, as in the other forms, upon insufficient nutrition of the brain. At this age, the injury is reparable, and what may be designated juvenile dementia, has the rare distinction of being curable. More frequently, it is the sequel of mania, melancholia, and severe affections of the nervous system. The deterioration here arises from actual changes in the nervous structure, which render healthy nutrition impossible; so that, although mitigation, and sometimes to a marvelous extent, is within reach of treatment, recovery is believed to be impracticable. Again, it is an affection of old age; and although senile dementia may seem but an exaggerated state of dotage, it is accompanied by such marked physical changes, as to leave no doubt that it originates in circumstances differing widely from that gradual degeneration of the

tissues which is evidenced by the "second childishness and mere oblivion." Lastly, this state may follow fever, when it is transitory, and generally of brief duration.

F. is one of the few morbid mental conditions recognized in our legal code, even by name, as relieving from the consequences of criminal acts, and as disqualifying for the administration and disposal of property. Esquirol, *Des Malad. Ment.*, tom. ii. p. 219.

FAUBOURG (Fr. for *faux-bourg*, a false, not genuine town, from *faux*, false, and *bourg*, a market-town; according to others the word is a corruption from *forbourg*, from the Late Latin *foris burgum*, without the town), a suburb in French cities, a part of the town now indeed within the walls, but which was without them, when in former days the walls were less extensive.

FAUCES, the opening of the mouth into the pharynx (q.v.), the back part of the mouth, consisting of the passage from the cheek cavity proper to the cavity of the pharynx. Above the fauces is the soft palate, and on either side are the pillars of the soft palate. See TONGUE; PALATE.

FAUCIT, HELEN (now Lady Martin); b. Eng., 1816; made her debut as an actress at Covent Garden, London, 1836, Jan. 5, as Julia in *The Hunchback*, and at once won a great reputation. She became the leading lady in Macready's Shakespearean revivals, and was also the original impersonator of the heroines in Bulwer's, Browning's, and other modern plays. After her marriage, 1851, to Theodore Martin, now Sir Theodore, she rarely appeared on the stage. She published *On Some of the Female Characters of Shakespeare*.

FAULK, a central co. of S. Dakota; 1010 sq. m.; formed in 1873. It is drained by a branch of the Dakota river; pop. '90, 4062. Co. seat, Faulkton.

FAULKNER, a co. in central Arkansas, on the Arkansas river; 623 sq. m. Pop. '90, 18,342. Co. seat, Conway.

FAULKNER, CHARLES JAMES, b. Va., 1806; graduated from Georgetown univ.; was admitted to the bar, 1829. He was a member of the Va. house of representatives, 1831; and of the state senate, 1841-44; was elected as a democrat from Va. to the XXXIId and three succeeding congresses; was appointed minister to France by Pres. Buchanan, 1859; served in the confederate army; and was elected as a democrat from West Va. to the XLIVth congress. He d. in 1884.

FAULKNER'S ISLAND, in Long Island sound; off the harbor of Guilford, Conn. It belongs to New York, and has a lighthouse and a fog-bell.

FAULT, the term in mining and geology for any interruption in the continuity of the strata, coupled with the displacement of the beds on either side of the line of fracture. See DISLOCATION.

FAUN. Faunus was a mythical personage, an ancient king of Italy, who instructed his subjects in agriculture and the management of flocks, and was afterwards worshipped as the god of fields and of shepherds. The festival of the *faunalia*, held on the 5th Dec., referred to the protection he exercised over agriculture and cattle. Fauna was his female complement. He was also worshipped as a prophetic divinity. As deity of the woods and of flocks and herds, he corresponds to the Greek Pan: the idea also arose of a plurality of fauni or fauns, like the Greek satyrs, who were represented as monster deities with short horns, pointed ears, tails, and goats' feet, and to whom all terrifying sounds and appearances were ascribed.

FAUNA, a term employed to designate animals collectively, or those of a particular country, or of a particular geological period. Thus, we speak of the fauna of Great Britain, the recent fauna, the fossil fauna, the fossil of the eocene period or formation, etc. The term bears the same relation to the animal kingdom that *flora* does to the vegetable. Its derivation is from the mythological fauns, regarded as the patrons of wild animals. In the fauna of any country are included only indigenous animals.

FAUQUIER, a co. in n.e. Virginia, between the Rappahannock and the Blue Ridge; 680 sq.m.; pop. '90, 22,590. Co. seat, Warrenton.

FAUQUIER, FRANCIS, d. 1768; for 10 years lieutenant-governor of Virginia. He was the successor of Gov. Dinwiddie, and his administration was popular and prosperous. He published in London in 1757 *Raising Money for the Support of the War*.

FAURE, FRANÇOIS FÉLIX, statesman, was born in Paris in 1841. At the opening of the Franco-Prussian war in 1870 he was a ship-owner and President of the Chamber of Commerce at Havre. He served during the war in the Garde Mobile, and in 1881 became a member of the Chamber of Deputies. He afterwards filled the office of Minister of Commerce in the cabinets of Gambetta and Ferry, was Secretary for the Colonies under Tizard, and Minister of Marine under Dupuy in 1894. On the resignation of President Casimir Perier (q. v.) he was elected President of the Republic, Jan. 17, 1895.

FAURE, JEAN BAPTISTE, b. 1830: a French vocalist, educated at the Conservatoire, and made his first public appearance in 1852. In 1857 he was made professor of singing in the Conservatoire. He has published collections of songs.

FAURIEL, CLAUDE CHARLES, a French philologist, historian, and critic, was b. at St. Étienne, in the department of Loire, 21st Oct., 1772; studied at the college des Oratoriens at Tournon, and afterwards at Lyon; and in 1799 was appointed to a situation

under Fouché; but, destitute of all political ambition or predilections, and passionately fond of learned studies, F. resigned his office in 1802, and devoted himself to the calmer pursuits of literature. He made himself familiar with Sanscrit, Arabic, and the treasures of classical antiquity and of the middle ages; and although he did not write much, comparatively speaking, yet the value of what he did write cannot be easily over-estimated. M. Renan may exaggerate when he affirms that F. "put in circulation the greatest number of ideas" of any contemporary writer; but even the Germans allow that in many points of literary history, criticism, and philology, F. was 20 years in advance of his age. After the July revolution, he was appointed a professor at the Sorbonne; in 1836, he published his chief work, *Histoire de la Gaule Méridionale sous la Domination des Conquérants Germains* (4 vols., Paris), which is reckoned one of the best specimens of historical investigation and art produced in modern times. Worthy of notice, also, particularly on account of its remarkable historical introduction, is his edition of the Provençal rhymed chronicle, entitled *Histoire de la Croisade contre les Hérétiques Albigeois* (Paris, 1837). F. also contributed several important essays to the literary journals of France, of which, perhaps, the best known was that on the origin of the Epic of Chivalry in the middle ages. He died at Paris, 15th July, 1844. Two years after his death appeared a collection of his professorial lectures, under the title of *Histoire de la Poésie Provençale* (3 vols., Paris, 1846), in which F. endeavors, with great erudition and originality of criticism, to show that to the Provençals must be attributed the composition and primitive development of the greater portion of the romances of chivalry, including those which describe the contests of the Christians and Moors in Spain, and those which form the Charlemagne cycle, thus finding the origin of the old Spanish and German poetry on the soil of France. F.'s views have, however, met with considerable opposition.

FAUSSE-BRAYE, in fortification, a low rampart encircling the body of a place, and raised about 3 ft. above the level ground. This work has been mostly discarded by modern engineers, except when used in front of curtains, under the name of *tenailles* (q.v.). The French engineers gave this title to the work, as an adaptation from the Italian term *fossa brea*, which had its origin from the *fausse-braye* being commonly in the ditch, in front of the main wall. The *fausse-braye* had the advantage of giving an additional tier of guns for defensive purposes; but the still greater disadvantage of affording facilities for the scaling of the parapet.

FAUSSE RIVIÈRE (in English, *False river*), is a lake in the state of Louisiana, which deserves notice chiefly as an index of the physical character of the country. Till about a century and a half ago, it was a channel of the Mississippi—a fact which is still probably expressed in its name. Here, as in other alluvial formations, the beds of the running waters are undergoing incessant changes.

FAUST, or **FUST**, **JOHANN**, the chief promoter of the invention of printing, a rich citizen of Mayence, d. in the year 1466. See **FUST** and **GUTENBERG**.

FAUST, **DR.**, according to tradition, a celebrated dealer in the black art, frequently confounded with the preceding, was b. at Knittlingen, in Würtemberg, or, as some say, at Roda near Weimar. He flourished during the latter half of the 15th and the beginning of the 16th centuries, and is said to have studied magic at Cracow. After having spent a rich inheritance left him by his uncle, F. is alleged to have made use of his "power" to raise or conjure up the devil, with whom he entered into a contract for twenty-four years, obtaining during that time his fill of earthly pleasure, but at its termination surrendering body and soul into the hands of the great enemy. The devil gave him an attendant spirit or demon, called Mephistopheles, though other names are given him by the later traditionists, with whom he traveled about, enjoying life in all its forms, and astonishing persons by working wonders, till he was finally carried off by the evil one, who appeared in terrible guise, between twelve and one o'clock at night, at the village of Rimlich, near Wittenberg, though several other places lay claim to that very questionable honor. Some have doubted, considering the monstrously mythical form in which his career has come down to us, whether such an individual as F. ever existed; but it is now generally believed that there was a basis of fact, on which tradition has built its gross superstructure. Gorres, indeed, asserts that one George Sabellicus, who disappeared about the year 1517, is the real F.; but Philip Melancthon—the man of all the reformers whose word in regard to a matter of fact would most readily be trusted—says that he had himself conversed with Dr. Faustus. Conrad Gesner (1561) is equally positive; and Luther, in his *Table Talk*, speaks of Dr. F. as a man lost beyond all hope. The opinion that prevails, and which is reckoned to be intrinsically the more probable, is that some man of this name, possessed of varied knowledge, may possibly have practiced jugglery (for the wandering savants of the middle ages had all a touch of the quack about them), and thus have been taken by the ignorant people for a dealer in the black art, and one who maintained a secret and intimate relation with evil spirits. His widely diffused celebrity not only occasioned the wonders worked by other so-called necromancers of an earlier age—Albertus Magnus, Simon Magus, and Paracelsus—to be attributed to him, but likewise many ancient tales and legends of a marvelous character were gradually transferred to him, till he finally appears as the very hero of magicians. But while, on the one hand, the narra-

use of F.'s marvels afforded amusement to the people, on the other, they were made use of for instruction by the clergy, who pointed out, in the frightful fate of F., the danger of tampering with the "black art;" and the abominableness of a life sunk in sensuality and vice. The myth of F. has received a manifold literary treatment. First come the *Volksbücher* (or people's books), which record F.'s enterprises and feats. The oldest of these now known appeared at Frankfort in 1588. Then came an "improved" edition of the same, by Widmann, entitled *Wahrhaftige Historien von denen gräßlichen Sünden Dr. Joh. F.'s* (true history of the horrible crimes of Dr. John F., Hamb. 3 vols., 1599); and in 1695, a work was published at Nürnberg by Pfitzer, based upon that of Widmann. The oldest of these books was translated into all the civilized languages of Europe. Impostors also published books of magic under the name of F., such as *Faust's grosser und gewaltiger Höllenzwang* (Faust's Great and Potent Book of Spells), *Fausten's Miraculokunst* (Faust's Art of Performing Miracles), and *Dreifache Höllenzwang* (The Threefold Book of Spells). These wretched productions are filled throughout with meaningless scrawls and figures, interspersed with texts from the Bible scandalously misapplied; but in the belief of the vulgar, they were supposed capable, when properly understood, of accomplishing prodigies. That the poetical art should in due time have seized on a subject affording so much material for the fancy to work upon, was inevitable; and consequently, German literature abounds in elegies, pantomimes, tragedies, and comedies on Faust. Since the end of the 17th c., the *Puppenspiel* (Puppet-show) of Dr. F. (first published at Leipsic in 1850) has been one of the most popular pieces in Germany. It forms the transition from the rude magic tales concerning F., to the later philosophic conception of the Faust-myth, which has become the most perfect poetical expression of the eternal strife between good and evil in the soul of man. The first writer who treated the story of F. dramatically was the English writer Christopher Marlowe, about the year 1600 (German translation by W. Müller, Berlin, 1818); but the grandest work on the subject is Goethe's *Faust*, the first part of which appeared under the title of *Dr. F. ein Trauerspiel* (Leip. 1790), and afterwards in a remodeled form, under the title of *F., eine Tragödie* (Tübingen, 1808). The second part was published after the author's death, at Stuttgart in 1833. Besides Goethe's drama, may be mentioned Lessing's masterly fragment, *F. und die Sieben Geister* (F. and the Seven Spirits); G. F. L. Müller's *Dr. F.'s Leben* (Dr. F.'s Life, Manh., 1778), and Klinger's *F.'s Leben, Thaten, und Höllenfahrt* (F.'s Life, Doings, and Descent Into Hell; Petersb. and Leip., 1791). The plastic art has also found a fit subject in Faust. In Auerbach's cellar at Leipsic, where F. is said to have performed many of his feats, are two rude daubs of the year 1525, representing F. and Mephistopheles riding out of the cellar on a wine-barrel. Rembrandt and Christoph von Sichem have also illustrated the story of F., and, in modern times, Cornelius and Retzsch. See Peter's *Die Literatur der Faustsage* (3d ed. 1857); Engel's *Zusammenstellung der Faust-Schriften* (Oldenburg, 1885).

FAUSTINA, mother and daughter. The former, *Annia Galeria*, usually spoken of as *Faustina Senior*, was the wife of the Roman emperor Antoninus Pius, and died 141 A.D.; the latter, known as *Faustina Junior*, was married to his successor, Marcus Aurelius Antoninus, and died at a village near Mt. Taurus in 175 A.D. Both, but particularly the younger, were notorious for the profligacy of their lives, which their exemplary husbands in vain endeavored to check. After their deaths, institutions for the relief of poor girls were founded both by Antoninus and Marcus Aurelius in honor of them, and were called "*puellæ alimentariæ Faustinae*." Marcus Aurelius, in his Meditations, speaks highly of his wife, and an attempt has been made by Wieland to defend her against the imputations of the historians of the emperors.

FAUSTINUS I., Emperor of Hayti, known, before his elevation to the throne, as Faustinus Soulouque, a negro originally of very humble circumstances, was b. in St. Domingo in 1785. In his earlier years, he acted as servant, and afterwards as adjutant, to gen. Lamarre. He subsequently served under presidents Petion and Boyer, and by the latter was raised to the rank of capt. After the year 1844, when the Haytian republic—of which gen. Boyer was then president—was dissolved, a struggle for the supreme power ensued, in which F. played an important part. In 1847, he was appointed by the senate president of the republic. On the 16th April, 1848, a dreadful massacre of the mulattoes in Port-au-Prince took place at his instigation. This, and similar measures, struck terror into the hearts of his opponents. In Aug., 1849, he had himself proclaimed emperor of Hayti, a title which he enjoyed for about ten years; but a revolution having broken out in 1858, and a republic having been declared, F. was forced to abdicate, 15th Jan., 1859. He died 6th Aug., 1867.

FAUVEAU, FÉLICE DE. b. Florence, 1802; a French sculptor of an old legitimist family in Brittany. She was compromised in the royalist movement of 1832, but escaped to Brussels. Among her works are "The Abbot" (from Scott's novel); "Judith showing the Head of Holophernes to the People;" the Dante monument, representing the death of Paolo Malatesta and Francesca da Rimini; and the tomb of a young Florentine girl.

FAUVELET, JEAN BAPTISTE. b. France, 1822; a painter, disciple of Meissonnier. Among his pictures are: "A Young Man Reading," "The Two Roses," "The Concert," "Nonchalance," "The Carver," "Two Musicians," and "The Prodigal Son."

FAUVETTE, a French name, partially adopted in the English language, for some of the little song-birds of the family *sylviada* or warblers, having straight slender bills slightly compressed in front, the ridge of the upper mandible curving a little towards the tip, and the legs not long. They mostly belong to the genus *curruca*, as the black-cap, the pettychaps or garden warbler, the whitethroat, etc.; and to the genus *salicaria*, as the sedge warbler, the reed warbler, etc.

FAVART, CHARLES SIMON, a French dramatist, was b. at Paris, 13th Nov., 1710, and first became known by his *La Chereuse d'Esprit*, performed in 1741. In 1745, he married Mile. Duronceray, herself a dramatic writer of some note, and a singer of remarkable talent, and in the same year became director of the *Opéra Comique*. The fine taste and judgment of F. and his wife soon obtained for their theater a great reputation. It was they who made the first attempt to harmonize the costume of the actors and actresses with their impersonations, and to put a stop to the ridiculous practice of decking out soubrettes and country-girls in the attire of court ladies. So powerful, however, was the opposition excited against them by the jealousy of the other theaters, that the *Opéra Comique* was closed in the first year of its existence. After some time spent with marshal de Saxe during his campaign in Flanders, F. and his wife returned to Paris, where the former continued to write operas. His wife died April 22, and he 12th May, 1792. F.'s success as a writer was very great; he may be reckoned the father of the comic opera, and the happy successor of Le Sage, Piron, etc. The number of his pieces amounts to about 60, of which the most celebrated are *Comment l'Esprit vient aux Filles*; *Le Coq du Village*; *Bastien et Bastienne*; *Ninnette à la Cour*; *Les Trois Sultanes*; and *L'Anglais à Bordeaux*. His works have been published several times. An edition in 10 vols. was published at Paris in 1810, under the title of *Théâtre de Monsieur et Madame Favart*. A very interesting book, entitled *Les Mémoires et la Correspondance de Favart*, giving delightful glimpses of the literary and theatrical world of the 18th c., was published at Paris in 1809 by his grandson.

FAVERSHAM, a municipal borough and seaport in the n. of Kent, on a navigable creek, opposite Sheppey isle, 8 m. w.n.w. of Canterbury. It chiefly consists of four streets in an irregular cross. It has a valuable oyster fishery, and carries on a large trade in fruit and hops. It sends much agricultural produce to London by boys. In the vicinity are large gun cotton and powder factories. Pop. '91, 10,478. Under the name of Favresfield, it was a seat of the Saxon kings, where Athelstan, in 930, held a Witenagemôte. It has the remains of an abbey founded by king Stephen, where he and his queen, Matilda, are buried. St. Crispin is said to have been apprenticed to a shoemaker here.

FAVIGNANA, the chief of the *Ægades*, a group of islands in the Mediterranean, off the w. coast of Sicily, lies at a distance of 6 m. from the Sicilian shore, and is about 6 m. long, with an average breadth of 2 m. It has a town of the same name, but the chief town is San Leonardo, on the eastern side of the island. F. is fruitful, has good pasturage, and produces excellent wine.

FAVORINUS, a sophist of the time of Hadrian, a native of Arles, in Gaul, but for many years a traveler in the east. He was on intimate terms with Plutarch, Herodes Atticus, Demetrius of Alexandria, Aulus Gellius, and with the emperor Hadrian himself. He seems to have been caustic and satirical, but politic; for when he allowed the emperor to carry off the honors of an argument in which he might easily have won, he merely remarked that it was foolish to dispute with one who was master of thirty legions. Only a few fragments of his works have been preserved.

FAVORS, or MARRIAGE FAVORS, bows of white satin ribbons distributed at marriages in Great Britain, and usually pinned on the breast of all concerned, attendants and positions included. The F. of those more immediately interested are sometimes enriched with orange-blossom. This is an old usage, connected with the love-knot of ancient northern nations; it forms almost the only remaining token of merriment in the nuptial ceremonial, and is, indeed, itself beginning to disappear.—See Brand's *Popular Antiquities*, edited by Ellis, article "Bride Favors."

FAVRE, JULES CLAUDE GABRIEL, a French advocate and minister, was b. at Lyons, 21st Mar., 1809. He was the son of a merchant, studied for the bar, and passed at Lyons in 1830. His political opinions were always very strongly republican, and when pleading in the course of numerous political lawsuits, F. not unfrequently placed the state solicitors, and even the judges, in a very embarrassing position by the boldness of his sentiments. As the defender of the *Mutuellists* at Lyons, in 1831, he was in danger of losing his life; this, however, did not prevent him from defending those who had been impeached in April, and commencing his speech with *Je suis républicain*. From 1834, Favre was a member of the Paris bar. In the Feb. revolution of 1848, he was home secretary, in which capacity he wrote the notorious circular for which Ledru-Rollin's administration was so severely reproached, investing the commissioners of the republic with dictatorial authority in the provinces. He was active as a member of the committee of foreign affairs. After the election of the 10th Dec., F. showed himself a persistent antagonist of Louis Napoleon, and after the flight of Ledru-Rollin, became the orator of the mountain. The *coup d'état* closed his political career at this time. He refused to take the oath of fidelity to the imperial government, and betook himself again to his profession. In 1858, he defended Orsini on his trial for a conspiracy to

murder. In the same year, however, he became a member of the legislature. In Sept., 1870, after the downfall of the empire, he was appointed minister of war, and carried on negotiations with count Bismarck. He resigned office in July, 1871, and resumed practice at the bar. F. was greatest in political repartee, and, though long accustomed to public strife, his language was notable for Attic elegance. He d. Jan. 19, 1880.

FAVULARIA, a sub-genus of *sigillaria*, including some of the most remarkable trees of the coal flora. See **SIGILLARIA**.

FA VUS (Lat. a honeycomb), a disease of the skin, chiefly of the hairy scalp, characterized by yellowish dry incrustations of more or less roundish form, and often cup-shaped, composed of the sporules and mycelia (q.v.) of a vegetable growth belonging to the order of fungi (q.v.). The disks of F. are produced with great rapidity, and spread rapidly, if not attended to at the first, over the whole scalp, destroying the bulbs of the hair, which becomes very short and thin, and then falls out altogether. F. is a disgusting and unsightly, but hardly a dangerous disorder; it is, beyond doubt, contagious, but only spreads where cleanliness is greatly neglected, and is therefore almost unknown among the better classes. It is far more common among children than among adults, and seems to be more frequent in Scotland than in England, and more frequent also on the continent than in either England or Scotland. The cure is sometimes attempted by a variety of medicated and simple ointments, and by pulling out the hair by the roots, or *epilation*, as it is called; but it seems hardly possible in inveterate cases to get rid of the disease without a very long persistence in habits of the most scrupulous cleanliness, and therefore the cure is seldom permanent, though easily attained for the time. F. is almost always followed by permanent baldness of the parts affected; unlike ringworm (q.v.), which is a minor disease of the same order.

The F. fungus, *achorion schoenleinii*, is nearly allied to the fungus which has recently proved so destructive to vines, and has by some botanists been placed in the same genus, *oidium*.

FAWCETT, EDGAR, b. New York, 1847; graduated at Columbia coll., 1867; from an early age has been a voluminous contributor of prose and verse to the leading periodicals and newspapers; and has published *Poems of Fantasy and Passion*, and several novels—*A Gentleman of Leisure*, *A Hopeless Case*, *An Ambitious Woman*, *Adventures of a Widow*, *Fubian Dimitry*; *Romance and Poetry*, poems; *Agnosticism*; *Her Fair Fame and Outrageous Fortune* (1894); *The Ghost of Guy Thyrie* (1896), *A Romance of Old New York* (1897).

FAWCETT, HENRY, 1833-84; b. Eng.; educated at Trinity hall, Cambridge, of which he was a scholar; graduated with high mathematical honors in 1856, and was elected a fellow in the same year. Mr. Fawcett was totally deprived of his sight in 1858 by an accident when shooting. Having written and published *A Manual of Political Economy*; the *Economical Position of the British Laborer*; and having been an extensive contributor of articles on economic and political science to various magazines and reviews, he was elected, in 1863, professor of political economy in the university of Cambridge. He unsuccessfully contested for a parliamentary seat, on liberal principles, Southwark in 1857; the borough of Cambridge in 1862; and Brighton in Feb., 1864; but he was returned for the last-named constituency in 1865, and was re-elected in 1868. He was unseated at Brighton at the general election of Feb., 1874, and was elected for Hackney in April of the same year. A new and revised edition of his *Manual of Political Economy* was published in 1869, with two new chapters on "National Education," and "The Poor Laws and their Influence on Pauperism;" and another edition with some additional chapters was published in 1874. He subsequently published *Pauperism—Its Causes and Remedies*; *Speeches on some Current Political Questions*; and *Free Trade and Protection*. Prof. F. married Millicent, daughter of Newson Garrett, of Aldeburgh, Suffolk, April 23, 1867.

FAWCETT, MRS. MILLICENT (*née* Garrett), wife of the late Prof. Henry Fawcett (q.v.), was born at Aldeburgh, Suffolk, Dec. 11, 1847. In 1867 she married Prof. Fawcett, to whom she rendered much assistance in his work. She has published, among other books, *Political Economy for Beginners* (1869), *Tales in Political Economy* (1874), and *Janet Doncaster*, a novel (1875), *Life of Her Majesty Queen Victoria* (1895), etc. *Essays and Lectures* (1872) was brought out jointly by Mr. and Mrs. Fawcett. Mrs. Fawcett has figured prominently in the woman's-suffrage question.

FAWCETT, PHILIPPA GARRETT, daughter of Professor Henry Fawcett (q.v.), was born at Cambridge, England, in 1868, was educated at Clapham high school, and by a private (lady) tutor, and after taking a course at University college, London, entered Newnham Hall, Cambridge, 1887, with a scholarship. Here she quickly distinguished herself as a student, and in 1890 was placed in the Tripos lists above the senior wrangler.

FAWKES, GUY (properly GUIDO), the head of the conspiracy known by the name of the gunpowder plot, was born of a Protestant family in Yorkshire, in the year 1570. He became a Roman Catholic at an early age, and served in the Spanish army in the Netherlands. Inspired with fanatical zeal for his new religion, on his return to England, he entered into a plot with several Catholic gentlemen for blowing up the king,

his ministers, and the members of both houses at the opening of parliament, 5th Nov., 1605. Guy F. was taken with the burning match in his hand, tried, and after having been put to the torture, was publicly executed Jan. 31, 1606. In remembrance of this event, in most English towns, but particularly in London, a grotesque figure, stuffed with straw, is carried about the streets on the 5th of Nov., and finally committed to the flames. A political and religious signification was again imparted to this custom by what was called "the papal aggression" in the year 1850, when the figure of cardinal Wiseman was substituted for that of Guy Fawkes.

FAY, ANDRÁS, a Hungarian author, was b. in 1786, at Kohany, in the county of Zemplén. After having studied philosophy and law at the Protestant college of Sáros-patak, F. was called to the bar. He held a situation for some time in the county of Pesth, which, however, he afterwards relinquished, in order to be able to devote himself altogether to literary pursuits. After two volumes of poetry, appeared the collection of fables (*Mesék*, Vien. 1820), and with the issue of that work F. obtained a decided reputation. The fables are like those of Phædrus and La Fontaine, but in prose. Richness of invention, simplicity of design, and truth of character, are the chief qualities for which the *Mesék* have become a household word among Hungarians. Among F.'s dramatic works may be mentioned the tragedy, *The Two Bathorys* (*A Két Báthory*, Pesth, 1827); the comedies, *Ancient Coins* (*Régi Penzek*), and *Hunters in the Matra* (*Mátrai Vadászok*). The novel, *The House of the Békéys* (*A Békéy-ház*, Pesth, 1832), is rather of a didactic kind, but exhibits many features of Hungarian domestic life. Besides these, F. was a constant contributor to literary and scientific periodicals, and had also his share in some of those pamphlets by which great social questions, as, for instance, female education, savings banks, etc., were brought to a successful issue in Hungary. In reading F.'s works, we are frequently reminded of Dean Swift. From 1825, which year may be said to have been the beginning of a new political life for Hungary, up to the year 1840, F. was foremost among the leaders of the liberal opposition in the county sittings of Pesth; but on the appearance of Kossuth, the strides of public life growing more and more rapid, F. gradually retired from the region of political controversy, turning his inventive mind to social improvements. The first savings bank of Hungary (at Pesth) was entirely F.'s work. His literary works were published in eight volumes at Pesth, in 1843-44. He was a directing member of the Hungarian academy of sciences. He died in 1864.

FAY. See FAIRIES.

FAY, JONAS, 1737-1818; b. Mass.; a surgeon under Ethan Allen at the surrender of Ticonderoga; a member of the convention that declared Vermont an independent state; secretary of the state constitutional convention; one of the council of safety; member of the state council; judge of the supreme court; and agent of the state before congress, Jan., 1777; Oct., 1779; June, 1781; and Feb., 1782.

FAY, THEODORE SEDGWICK; b. N. Y., 1807; studied law, and was admitted to practice in 1828, but contributed to the *New York Mirror*, and subsequently became editor of that periodical. In 1832, he published *Dreams and Reveries of a Quiet Man*. After three years of European travel, he published his journal under the title, *The Minute Book*. In 1835, he published *Norman Leslie*, a novel, of which a second edition was issued the same year. From 1837 to 1853 he was U. S. secretary of legation at Berlin; and, 1853-60, resident minister at Berne, Switzerland. He has also published *Sidney Clifton*; *The Countess Ida*; *Hoboken*; *Robert Rueful*; *Ulric, or the Voices*, a poem; *Views of Christianity*; *Great Outlines of Geography*; *First Steps of Geography*; *a History of Switzerland*; and a series of papers on Shakespeare.

FAYAL, one of the most important of the Azores (q. v.), contains about 69 sq. m., and about 24,000 inhabitants. The soil of the island is fertile. In its center is a mountain 3,000 ft. in height; and on its s. e. coast a convenient bay with good anchorage. The advantages have caused it to be more frequented than any other island of the group except St. Michael. Its principal town, Horta, stands on this bay, which is sheltered by a breakwater.

FAYERWEATHER, DANIEL B., 1821-90; b. Stepney, Conn.; merchant. He made specific bequests to charitable and educational institutions aggregating over \$2,000,000, and to trustees for similar distribution about \$3,000,000. His will was subjected to a remarkable contest.

FAYE'S COMET, discovered Nov. 22, 1843, in the constellation Orion; a bright nucleus with a short tail, but never sufficiently developed to be seen with the naked eye. Le Verrier showed that this comet came into our system as far back as 1747. It was rediscovered Nov. 28, 1850, by Chellis of Cambridge, and it came to perihelion Sept. 12, 1858. It was also seen in 1869. Its period is supposed to be nearly $7\frac{1}{2}$ years, but it is too small to be of much interest. Its discoverer, Herve Auguste Etienne Albans Faye, a French astronomer, was born in 1814. He became a member of the French institute, and was elected to the section of astronomy in 1841, and the bureau of longitudes in 1862. Two years later he entered the imperial council of public instruction, and was made an officer of the legion of honor. From 1848 to 1854, he was professor of geodesy in the *Ecole Polytechnique*, and in 1854 was chosen rector of the *Académie Universitaire* at Nancy. He has written valuable papers and text-books on astronomical science.

FAYETTE, a co. in n.w. Alabama; 700 sq. m.; pop. '90, 12,823, inclu. colored. It is drained by the Sipsey and affluents of the Black Warrior rivers. Surface hilly and chiefly forest-land. Co. seat, Fayette.

FAYETTE, a co. in w. Georgia, on Flint river; 162 sq. m.; pop. '90, 8728, includ. colored. It has a varied surface, undulating or level, and is largely covered with timber. Cotton and corn are the chief productions. There are beds of iron ore and deposits of valuable granite. Co. seat, Fayetteville.

FAYETTE, a co. in s. central Illinois, on the Kaskaskia river, and the Illinois Central, and the Terre Haute and Indianapolis railroads; 720 sq. m.; pop. '90, 23,367. The surface is level, and much of it is covered with timber; soil fertile, producing corn, wheat, oats, hay, pork, etc. Coal and limestone are among the minerals. Co. seat, Vandalia.

FAYETTE, a co. in s.e. Indiana, on a branch of Whitewater river; traversed by the Cincinnati, Hamilton, and Dayton, the Cleveland, Cincinnati, Chicago, and St. Louis, and the Fort Wayne, Cincinnati, and Louisville railroads; 210 sq. m.; pop. '90, 12,630. Undulating surface and fertile soil, with considerable timber. The usual cereals are produced, and there is abundance of limestone. Co. seat, Connersville.

FAYETTE, a co. in n.e. Iowa, on the Burlington, Cedar Rapids, and Northern, and the Chicago, Milwaukee, and St. Paul railroads; drained by Turkey and Volga rivers; 720 sq. m.; pop. '90, 23,141. It has a prairie and forest surface, and produces wheat, corn, oats, hay, etc. Good limestone is found. Co. seat, West Union.

FAYETTE, a co. in n. central Kentucky, on the Kentucky river, intersected by the Chesapeake and Ohio, the Louisville and Nashville, the Southern, and other railroads; 252 sq. m.; pop. '90, 35,698, incl. colored. The surface is varied, and offers some delightful scenery. The soil is very fertile, producing wheat, oats, corn, cattle, etc. Co. seat, Lexington.

FAYETTE, a co. in s. w. Ohio, crossed by the Baltimore and Ohio, the Cincinnati, and Muskingum Valley and other railroads; 398 sq. m.; pop. '90, 22,309. The surface is nearly level, and the soil deep and fertile, producing corn, wheat, cattle, pork, etc. Co. seat, Washington.

FAYETTE, a co. in s. w. Pennsylvania, on the border of West Virginia, intersected by the Youghiogheny river, and bounded by the Monongahela river; crossed by the Pennsylvania and the Baltimore and Ohio railroads; 830 sq. m.; pop. '90, 80,006. The surface is hilly, and largely covered with forests; soil fertile; chief productions, wheat, corn, oats, wool, pork, and butter. Co. seat, Uniontown.

FAYETTE, a co. in s. w. Tennessee, on the Mississippi border, crossed by the Nashville, Chattanooga, and St. Louis, and the Memphis and Charleston railroads; 630 sq. m.; pop. '90, 28,818, includ. colored. Surface nearly level, with much forest-land. Products, wheat, corn, cotton, sweet potatoes, etc. Co. seat, Somerville.

FAYETTE, a co. in s.e. Texas, on the Colorado river, reached by the Galveston, Harrisburg, and San Antonio and other railroads; 963 sq. m.; pop. '90, 31,481, includ. colored. Surface undulating, and soil fertile; productions, cotton, corn, cattle, etc. Co. seat, La Grange.

FAYETTE, a co. in central West Virginia, bisected by the Kanawha river and the Chesapeake and Ohio railroad; 750 sq. m.; pop. '90, 20,542, includ. colored. Surface rough, with fine mountain scenery; soil fertile. Co. seat, Fayetteville.

FAYETTEVILLE, city and co. seat of Cumberland co., N. C., situated on the west bank of Cape Fear river, at the head of navigation, 120 miles from Wilmington and is reached by the Cape Fear and Yadkin Valley railroad, and by a branch of the Atlantic Coast Line system. It was settled in 1762 and received its city charter in 1893. In 1861, Apr. 22, the U. S. arsenal at this point was seized by the confederates, but in 1865, Mar. 11-14, the city was occupied by General Sherman, who destroyed the arsenal. Fayetteville has a State colored normal school, a military academy, high school, churches, a bank, newspapers, and manufactures of cotton, turpentine, flour, carriages, wooden-ware, edge-tools, etc. By means of locks and dams the river is navigable to the coal mines of Chatham co. Pop. '80, 3485; '90, 4222.

FAYUM, the name of an Egyptian province forming a basin or depression, in the Libyan desert, having an area of about 493 sq. m. and lying on the western side of the Nile with which it is connected by a narrow valley. The basin is about 30 m. across, and at its lowest point is about 100 feet below the banks of the Nile. Irrigation renders it a very fertile region, producing in great quantities, roses, apricots, figs, vines, olives, etc., in addition to the ordinary useful plants of the country. In ancient times it contained the famous reservoir known as lake Moeris (q. v.), on whose banks was the "labyrinth," reckoned as one of the wonders of the ancient world. Its waters are used in irrigation, the lake being supplied by a canal from the Nile. Since 1887 important explorations have been made by W. M. Flinders Petrie and others, who have brought to light a number of interesting inscriptions, among others, some containing the earliest alphabetical signs used by the Greeks. Excavations were made on the sites of several of the ancient cities in the province, whose former capital was Crocodilopolis, afterwards Arsinoë. The modern capital, Medinet-el-Fayum, stands near its site. See W. M. Flinders Petrie, *Hawâra, Biahna and Arsinoë* (1889).

FAZY, JEAN JAMES, 1796-1878; a Swiss statesman, educated in France, and connected with Parisian journalism. Returning to Switzerland in 1832, he was active in the

establishment of a new constitution, and of the introduction of trial by jury. In 1846, he was at the head of a provincial government of radicals in Geneva, and subsequently a conspicuous advocate of the new constitution. In 1853, he was vice-president of the federal council of states. He was again at the head of the Geneva government in 1855. In 1864, he was compelled to resign, and being indicted for complicity in the riots of that year, he fled to France, but subsequently returned, and occupied a seat in the grand council, which he resigned in 1865, but resumed again in 1868.

FEAL AND DIVOT is a predial servitude (q.v.) peculiar to the law of Scotland, in virtue of which the proprietor of the dominant tenement possesses the right of turning up and carrying off turf from the servient tenement for the purpose of building fences, roofing houses, and the like. This, as well as the servitude of fuel, implies the right of using the nearest grounds of the servient tenement on which to lay and dry the turf peats (q.v.) or feal. These servitudes do not extend beyond the ordinary uses of the actual occupants of the dominant tenements.

FEALTY (Lat. *fidelitas*) is the fidelity which a man who holds lands of another owes to him, and contains an engagement to perform the services, or to pay the dues, for which the land is granted. It was embodied in an oath, by which the tenant bound himself on entering to the lands. In taking the oath of fidelity, Littleton says, s. 91, that the tenant shall not kneel, nor shall make such humble reverence as in homage. The only object of F. in modern times is to keep up the evidence of tenure where no other services are due; but even to this effect it has gone into desuetude.

FEAR, MANIA OF, OR PANPHOBIA. There are many morbid manifestations of the instinct of cautiousness. Sudden fear in sleep, horrible dreams, nightmare, sleep-walking, have been regarded as symptoms of a special disease. Actual terror from irregular circulation in the sensory ganglia; the sense of falling or drowning in cardiac affections; incubus from disturbance of the circulation in the larger vessels by repletion, plethora, or position, where there is the superaddition of a delusion to the feeling of apprehension—are all allied and distinguished by involuntary and excited cautiousness. It is not only, however, when the intelligence may be supposed to be dormant, and the instincts awake, that such exaggerated fears paralyze minds otherwise sane and sound. Murat, "the bravest of the brave," and James I. of England, learned if not wise, were subject to vague, uncontrollable panics, which for a time unmanned them. The condition is often found associated with disease of the heart, as a consequence and concomitant rather than a cause. The presence of the *habitual* dread of evil, the fear of death, the sleepless and breathless anxiety during darkness, or solitude, or silence, as well as the sudden, wild, ungovernable panic, point to the existence of organic or functional diseases of the heart; and conversely, excited or irregular action of the organ, murmurs, angina, lead the astute psychologist to predicate fear as a characteristic of the mental condition. It precedes, and is believed to produce chorea, cancer, and scirrhus. Proximally, however, it depends upon alterations in the capillary circulation, or nervous structure of the brain. Its characteristic is involuntary, irresistible, blind terror, which arises and continues without an adequate cause, and which is not influenced by reason or religion, not even by the removal of the supposed object of alarm. The disease has appeared epidemically during commercial panics, during the horrors of cholera and plague, and in that singular affection called timoria, which is marked by debility, tremor, and terror, and has been traced to the effects of the damp, unhealthy regions in Sardinia and Sicily, where it exclusively occurs. Panphobia is hereditary, and has been traced through three successive generations. In reviewing the unobtrusive members of an asylum family, the pallid, startled, staring, flickering countenances may be detected as those of patients laboring under fear. They resemble melancholics in pallidity of skin, but in place of courting they shrink from sympathy; though horror-stricken by gloom, they hide in corners, they escape, they shriek in desperation, they climb trees, and apparently inaccessible places; and encounter real in order to elude fancied dangers; or they are motionless, paralyzed. They fear and flee from enemies, police, demons, death, punishment; indescribable agonies themselves.—Feuchtersleben, *Principles of Medical Psychology*, p. 281; Arnold, *Observations on Nature, Kinds, Causes, and Prevention of Insanity*, etc., vol. i. p. 257.

FEAR, CAPE. This cape is found at the southern extremity of Smith's Island, being the most southerly point in the state of North Carolina. The light in its lighthouse is one hundred and ten feet above the sea. Cape Fear river is formed by the Deep and Haw rivers. It runs s.e. and enters the Atlantic, being two hundred and fifty miles long, and navigable for more than half its length for steamboats. It is the largest river wholly within the state of North Carolina.

FEAST OF WEEKS, a name given to the Jewish festival of *pentecost* (q.v.) because it came exactly seven weeks after the Passover.

FEASTS. See **FESTIVALS**.

FEATHER, a river of California, and a feeder of the Sacramento, runs through one of the richest gold-fields in the state. It receives the Yuba near Marysville, which appears to mark the head of navigation—the distance down the F. and the Sacramento to the harbor of San Francisco being about 100 miles.

FEATHERFOIL, or **WATER VIOLET**, the *Hottonia inflata* of the United States, and *Hottonia palustris* of Europe, named from Peter Hotton, a Dutch botanist. It is a primulaceous plant, which grows submerged in water, but bears its blossoms, in the European species of great beauty, on long scapes sent up into the air.

FEATHER GRASS, *Stipa*, a genus of grasses remarkable for the long awns which give a peculiar and very graceful appearance to the species, mostly natives of warm temperate climates. In some of them, the awn is beautifully feathered. This is the case in the best known species, the **COMMON F. G.** (*S. pennata*), a very doubtful native of Britain, but found on dry hills in the middle and s. of Europe. It is a perennial, easy of cultivation, and a favorite ornament of our gardens. When gathered before the seeds are ripe, its feathery awns—sometimes a foot in length—remain attached, so that tufts of F. G. retain their beauty throughout winter, and form one of the most pleasing and familiar decorations of rooms. They are often dyed, to give variety to the decoration, but are never more beautiful than in their natural yellowish-white color. The feathery awns not only assist in the diffusion of the seed, which is carried by the wind to great distances, but in a very interesting manner help to fix it in the soil. The seed alights vertically, the furrowed base of the awn becomes twisted, so that its furrows form the threads of a screw, the feathery portion becomes horizontal, the wind acts on it, and the seed is screwed into the ground—a reverse action being prevented by stiff hairs which act as barbs.—The esparto grass of Spain is nearly allied to the common feather grass.

FEATHERS, a complicated modification of the tegumentary system forming the external covering or plumage of birds, and peculiar to this class of animals. Notwithstanding the varieties of size, strength, and color, all F. are composed of a quill or barrel; a shaft; and a vane, beard, or web, on either side of the shaft, the vane consisting of barbs and barbules.

The quill by which the feather is attached to the skin is wider but shorter than the shaft, and forms a semi-transparent, horny, cylindrical tube, which terminates below in an obtuse extremity, presenting an orifice termed the lower umbilicus. A second orifice, leading into the interior of the quill, and termed the upper umbilicus, is situated at the opposite end, where the two vanes meet and unite. The cavity of the quill contains a series of conical capsules fitted one upon another, and united by a central pedicle; and the whole structure presents a remarkable combination of strength and lightness.

The shaft is always of greater length than the quill, and tapers gradually to its free extremity; it is flattened at the sides, is more or less convex on the back, and presents a longitudinal groove inferiorly. It is composed of white, elastic, spongy structure, which is covered by a thin horny sheath.

At the point of junction of the shaft and quill, we usually observe—except on the F. of the wings and tail—a small supplementary shaft given off, which is furnished with barbs or fibers, and is termed the plumule or accessory plume. In the ostrich it is altogether absent; in the rhea, it is represented by a tuft of down; in the emu, on the other hand, it equals the original F. in size, so that the quill supports two shafts; and in the cassowary there is a second plumule of considerable size, so that the quill presents three distinct shafts.

The vanes or webs are composed of numerous barbs or small fibers arranged in a single series along each side of the shaft. They are fine prolongations of the outer coat of the shaft, are of a flattened form, and lie inclined towards the apex of the feather, with their flat sides toward each other, and their margins in the direction of the external and internal sides of the feather. The barbs are broader near the shaft than at the free apex, and in the large wing-feathers the convexity of one is received into the concavity of another. They are, however, generally kept in position by the barbules, which are minute curved filaments arising from the upper edge of the barb, much as the latter arises from the shaft. There are two sets of these barbules, one curved upwards, and the other downwards, and those of one barb hook so firmly into those of the next, as to form a close and compact surface. In the ostrich, the barbules are well developed, but are loose and separate, and it is this arrangement which gives to the F. of this bird their soft, plumous appearance.

F. present numerous gradations of structure. In the cassowary, the wings, instead of being provided with ordinary F., are furnished with five cylindrical stalks destitute of barbs, so that here we have merely the quill and shaft. On the breast of the wild turkey there is a tuft of F. resembling long black hair. In the *dasylophus cumingi*, the F. of the crest, breast, and throat are changed, at their extremities, into round, horny lamellæ, looking like shining black spangles; and in the common waxwing or Bohemian chattering, some of the wing-feathers present at their extremities small horny expansions, resembling red sealing-wax, both in color and consistence.

Besides the common F., the skin of many birds, especially of aquatic species—in which plumules rarely exist—is covered with a thick coating of down, which may be described as consisting of very minute F., each of which is composed of a very small soft tube lying in the skin, from the interior of which arises a minute tuft of soft filaments, without any central shaft. This downy covering secures warmth without weight, like the soft fur at the base of the hair of arctic mammals. In most birds, the

skin also bears a good many scattered hair-like appendages, which indicate their relations to the ordinary F. by the presence of a few minute barbs towards the apex.

F. are developed in depressions of the skin, lined by an inversion of the epidermis which surrounds the bulb from which each feather springs; they grow, much in the same manner as hairs, by the addition of new cells from the bulb, which becomes modified into the horny and fibrous stem, and by the elongation of previously existing cells. They are, when first formed, living vascular parts, growing by nutrient vessels; but when they are fully formed, the vessels become atrophied, and the F. become dried up, and gradually die from the summit to the base. For a full account of the development of the different parts, we must refer to prof. Owen's article, "Aves," and to prof. Huxley's article, "Tegumentary Appendages," in the *Cyclopædia of Anatomy and Physiology*.

F. grow with great rapidity, and in some birds attain a length of more than 2 feet. They are almost always renewed annually, and in many species oftener; hence it may readily be conceived how much vital energy must be exhibited in their development, and how critical the period of molting must be. The plumage is generally changed several times before it attains the state which is regarded as characteristic of the adult bird; these changes may occupy a period usually ranging from one to five years.

Notwithstanding their extravascular nature, F., as is well known, undergo a change of color after they are completely formed. In yearling birds, the winter plumage, which succeeds the autumnal molt, gradually assumes brighter tints, the new color commencing at the part of the vane nearest the body, and gradually extending outwards till it pervades the whole feather. Dr. Weinland, an American naturalist, is of opinion, from a comparison of bleached specimens in museums, with recent ones taken from the bird, that the brightness and fading of the colors are due to the increase or diminution of an oily matter. Thus, the microscopic examination of the vane of F. from the breast of a fresh merganser showed numerous *lacunæ* containing a reddish oil-like fluid; some weeks after, the same F. having become nearly white from exposure to light, disclosed air-bubbles instead of the reddish fluid. If this fluid is an actual oil, as is most probably the case, it could make its way into the non-vascular tissue by mere physical imbibition; and on the varying quantities of this oil the variations of plumage would depend.

The property possessed by the plumage of most birds, of keeping the surface protected from moisture, is well known. This is due to two causes. Most birds are provided with an oil-gland at the base of the tail, whose secretion is distributed over the F. by means of the bill; and, additionally, the shedding of water is partly due to a thin plate of air entangled by the feathers.

The F. vary in form in different parts of the body, and afford zoological characters for the distinction of species. Hence, they have received distinct names, such as primaries, secondaries, tertiaries, etc., in ornithology. These terms are explained in the article BIRDS.

The chief uses to which F. are applied in the arts are three—*pens*, due to the peculiar elasticity of the barrels; *bed-feathers*, due to the combined softness and elasticity of the barbs; and *ornament*, due to the graceful forms and delicate tints of the whole feather. The mode of preparing the barrels for pens is described under QUILLS.

Bed-feathers were used in England in the time of Henry VII.; but it is not known how much earlier. At the present day, goose-feathers are preferred, the white rather than the gray. What are called *poultry F.*, such as those of the turkey, duck, and fowl, are less esteemed, on account of their deficient elasticity. Wild-duck F. are soft and elastic, but contain an oil difficult to remove. The following is one among several modes of preparing F. for beds. Clean water is saturated with quicklime; the F. are put into a tub; the lime-water is added to the depth of a few inches; the F. are well steeped and stirred for three or four days; they are taken out, drained, washed in clean water, dried upon nets, shaken occasionally while drying, and finally beaten to expel any dust. The larger establishments, however, now prepare bed-feathers by steaming, which is found to be a more profitable and efficient process. The *down*, which is of so light and exquisite a texture as to have become the symbol of softness, is mostly taken from the breasts of birds, and forms a warm and delicate stuffing for beds, pillows, and coverlets. The most valuable is that obtained from the eider-duck, described under EIDER.

F. used for head-dresses, or other purposes of ornament, are selected according to the forms and colors which they display. The *ostrich*, a very valuable kind of feather, may be taken as an example of the way in which ornamental F. generally are prepared by the *plumassier*. The mode of catching the bird itself is noticed under OSTRICH; it suffices here to state that the hunters endeavor to avoid injuring the F. by blood or blows. When brought to England, the F. are assorted according to quality; those from the back and above the wings are the best, the wing-feathers next best, and the tail-feathers least valued. The F. of the male are rather more prized than those of the female. They are cleaned for use by repeated soakings and washings in water, sometimes with and sometimes without soap. There is also a process of bleaching by means of burning sulphur. When dried by being hung upon cords, the F. pass into the hands of the dresser, who opens the fibers by shaking, gives pliancy to the ribs by scraping them with bits of glass, and curls the filaments by passing the edge of a blunt knife over them. If the F., whether of the ostrich or any other bird, remain in the natural

color, little more has to be done; but if a change of tint be required, the F. easily take dye-materials—such as safflower and lemon-juice for rose-color or pink, Brazil-wood for deep red, Brazil-wood and cudbear for crimson, indigo for blue, turmeric or weld for yellow, etc. A process of bleaching is adopted before the dyeing, except for black.

The kinds of F. chiefly used for ornament are those of the ostrich, adjutant, rhea or American ostrich, emu, osprey, egret, heron, antrenga, bird of paradise, swan, turkey, peacock, argus pheasant, ibis, eagle, and grebe. White ostrich F. are prepared chiefly for ladies' head-dresses; and black for the Highland regiments and for funeral trappings. The white and gray marabout-stork F., imported from Calcutta, are beautifully soft and light, and are in request for head-dresses, muffs, and boas; the white kinds will sometimes sell for their weight in gold. The flossy kinds of rhea feather are used for military plumes, and the long brown wing F. for brooms and brushes. Osprey and egret F. are mostly used for military plumes by hussar troopers. Bird of paradise F. are much sought after by oriental princes for turban-plumes. Cocks' F. are used for ladies' riding-hats and for military plumes. Dr. Macgown, who was United States consul at Ningpo a few years ago, has described, in the *American Journal of Science and Art*, an ingenious process which the Chinese adopt for combining brilliant-colored F. with bits of colored metal into garlands, chaplets, frontals, tiaras, and other ornamental articles.

FEATHER STAR, *Comatula rosacea*. An interesting member of the class of echinoderms, order of crinoids. It has a pentagonal disk or body composed of numerous polygonal plates from which spring ten slender, flexible, feathery arms, formed of numerous calcareous pieces placed end to end, but admitting of free motion. The arms are for locomotion and not prehension. The mouth is central and the alimentary canal is entirely contained in the disk or body, no part of it sending branches into the arms, as in asteroidae. The feather star feeds upon minute organisms, which it draws into its stomach by the action of cilia in the alimentary canal. When young the animal is attached to a stalk, and has been mistaken and described as a distinct species under the name of *pentacrinus Europæus*. In attaining the adult state the animal becomes free. The genus *comatula* has a wide distribution, inhabiting most seas.

FEATHER-STONE, meaning, doubtless, *federal stone*, a stone table in the open air at which the ancient courts-baron were held, and where covenants were made.

FEBIGER, CHRISTIAN, 1746-96; a revolutionary soldier, a native of Denmark. He was taken prisoner in Arnold's attack on Quebec, served honorably at Bunker Hill, Stony Point, and Yorktown, at the latter place commanding a Virginia regiment. In his later years he was treasurer of the state of Pennsylvania.

FEBRICULA (Lat. a little fever), sometimes called also ephemera (Gr. a fever of a day), a fever of short duration and mild character, having no distinct type or specific symptoms by which it can be distinguished and described. See FEVER.

FEBRIFUGE (Lat. *febris*, a fever, and *fugo*, I drive away), a medicine calculated to remove or cut short fever (q. v.).

FEBRONIANISM, in Roman Catholic theology, a system of doctrine antagonistic to the admitted claims of the Roman pontiff, and asserting the independence of national churches, and the diocesan rights of individual bishops in matters of local discipline and church government. The name is derived from the *nom de guerre*, Justinus "Febro-nius," assumed by John Nicholas von Hontheim, coadjutor archbishop of Treves, in a work on these subjects, entitled *De Præsenti Statu Ecclesie*, which he published in the year 1767, and which, with its several successive volumes, led to a violent and protracted controversy, and elicited the severest censures of the Roman tribunals. See HONTHEIM, GALLICAN CHURCH.

FEBRUARY, the second month of the year, has ordinarily 28 days, but in leap-year it has an additional or intercalary day. Among the Romans, it had originally 29 days in an ordinary year, but when the senate decreed that the eighth month should bear the name of Augustus, a day was taken from F., and given to August, which had then only 30, that it might not be inferior to July. The name is derived from the circumstance, that during this month occurred the Roman festival called the Lupercalia, and also Februalia, from *februare*, to purify.

FEBRUUS (connected with Lat. *februare*, to purify) was the name of an old Italian divinity, whose worship was celebrated with lustrations during the month of Feb. The ceremonies instituted in his honor were believed to have the effect of producing fertility in man and beast. F., whose name in the Etruscan language is said to have signified god of the lower world, was also worshiped as such by the Romans, and identified with the Greek Pluto.

FECAMP, a manufacturing t. and seaport of France, in the department of Seine Inférieure, is situated in a narrow valley, flanked on either side by steep cliffs, at the mouth of a stream of the same name on the English channel, 23 m. n.e. of Havre. It consists mainly of one long street. Its principal building is the abbey church of the Benedictines, in the early pointed style, and dating from the 13th century. The harbor is frequented by colliers from Newcastle and Sunderland, and by Baltic timber ships

and fishing vessels. F. has cotton-mills, oil-mills and various other industrial establishments. Pop. '91, 12,825.

FECHNER, GUSTAV THEODOR, a German savant, and one of the principal writers on the relations between the mental and physical sides of man's nature, was born at Gross-Särchen in Lower Lusatia, April 19, 1801. He studied at Sorau and Dresden, and then proceeded to Leipsic where he studied medicine and physics, and in 1834 was appointed professor of physics in the university, giving special attention to electro-chemistry, galvanism, and the theory of color. In 1839 a disease of the eyes developed, and obliged to take up other branches of study, he selected anthropology, natural philosophy, and psychophysics. He died November 18, 1887. Fechner's versatility is abundantly shown in the titles of his books. These include *Stapelia mixta* (1824), humorous essays published under the pen-name of Dr. Mises; *Beweis, das der mond aus Jodine bestehe* (1832), a humorous treatment of scientific problems; three volumes of poems of considerable merit; *Büchlein vom Leben nach dem Tode* (1836); *Gedichte* (1842); and *Räthselbüchlein* (3d ed., 1865); and among other works, chiefly scientific, are a translation of Biot's *Handbook of Experimental Physics* (5 vols. 1828-29); *Massbestimmungen über die galvanische Kette* (1831); *Nanna, oder über das Seelenleben der Pflanzen* (1848); *Zend-avesta oder über die Dinge des Himmels und des Jenseits* (3 vols. 1851); *Elemente der Psychophysik* (2 vols. 1860), his chief work; and *Physikalische und Philosophische Atomenlehre* (2d ed. 1864). Fechner's "psycho-physical law" is ably discussed in a paper in *Mind* for 1876.

FECHTER, CHARLES ALBERT, actor, 1824-79; b. London. His father was of German and his mother of Italian descent. He was educated in France, and in 1840, appeared in private theatricals; in 1841, was with a strolling company playing at Florence, returning to Paris the same year and studying at the *conservatoire* with a view of entering the theater Française. For three years he studied sculpture, but gave it up for the stage, and in 1844 made his *début* in Paris as "Seyd" in Voltaire's *Mahomet*. Afterwards he played in Berlin, and in 1847 took a French company to London. From 1848 to 1860, he was the reigning favorite in Paris. He was the original "Armand Duval" in *La Dame aux Camelias*, in which part he won remarkable success. In 1860 he made his first appearance in English drama in London in *Ruy Blas*, following with *Corsican Brothers*, *Don César de Bazan*, *Hamlet*, *Othello*, *Bel Demonio*, *Belphegor*, *Master of Ravenswood*, and as "Obenreizer" in *No Thoroughfare*. While abandoning the traditions of the English stage, Fechter showed himself capable of appreciating the difficulties he had to contend with, and in some measure of surmounting them. The impersonation was, upon the whole, one that marked him as an actor of very high powers. The same may be said of his representation of "Othello." Subsequently he became the lessee of the Lyceum theatre, playing the chief part in most of the pieces produced. In 1870, he paid a successful visit to the United States, where he thenceforward remained. He undertook to manage a theatre in Boston but did not succeed, and in 1874, he appeared again in New York with Lizzy Price (who became his wife). Not long afterwards he retired to a farm in Pennsylvania, where he died.

FECKENHAM, or FECKNAM, JOHN DE, 1516-1585; the last abbot of Westminster, and the last mitred abbot who sat in queen Elizabeth's parliament. He was chaplain to Bonner, bishop of London; and when the latter was deprived of his see, Feckenham was sent to the Tower. Although for much of the time a prisoner, he was active in political matters. Queen Mary released him and made him her chaplain. He was sent to lady Jane Grey, two days before her execution, to commune with her, and "to reduce her," says Foxe, "from the doctrine of Christ to queen Mary's religion." It is said that Elizabeth offered him the archbishopric of Canterbury; but that he refused it because he could not conform to the new (Protestant) faith. All his influence was thrown against the reformation and its doctrines.

FECULA, or FÆCULA, a term applied to starch obtained from various sources; in France, generally restricted to the starch of the potato. See **STARCH**.

FECUNDA'TION, or FERTILIZATION, in plants, takes place according to laws similar to those which prevail in the animal kingdom. In plants, however, the organs of reproduction are not permanent as in animals, but fall off—the male organs generally soon after fecundation, the female after the ripening of the seed. The male seminal substance, called *pollen*, never exists in a fluid state, but always in that of granules of various forms (*pollen grains*), which consist each of one cell, whose covering is of various thickness, and contains the impregnating substance. After the dehiscence of the anthers, the pollen gets into contact with the stigma of the pistil, which in its lowest and thickest part (the *ovary or germen*) contains the rudiments of the future seeds (*ovules*). The inner layer of the cell-covering of the pollen grain separates from the outer and thicker layer, as if it came out of a bag, and continuing to be elongated by growth, is carried down through the *style* to the germen, where it reaches the *foramen* or small opening of the embryo sac, and comes into contact with the ovule, or even in many cases penetrates into the ovule itself between its cells. By this time, one or other of the cells of the ovule has become considerably more enlarged than the other cells, and what is called the *amnion* has been formed, in the mucilaginous fluid of which (*protoplasma*), after the contact of the pollen-bag, through the dynamic operation of its contents, a *cell-germ* or *cytoblast* is soon developed. This cytoblast is the first commencement of a new and distinct cell, which divides into two cells. These

increase, by continually repeated separation of new cells, into a cellular body, which forms the more or less perfect *embryo* of a new plant. If the organ from which the pollen has proceeded, and the organ which contained the ovule, belong to the same plant or to plants of the same species, the embryo arising from this fecundation becomes a plant of the same species. But if the pollen by which the fecundation is affected comes from a plant of another species than that to which the plant belongs in whose germen the embryo is formed, the seed resulting from this fecundation will not, when it grows, produce plants of the same species, but *hybrids*, intermediate between the parent plants, and with various degrees of resemblance to one or other of them, but not perfectly corresponding with either. Hence the production of hybrids, and multiplication of varieties of plants in gardens, by what is called the artificial impregnation of the stigma of one plant with the pollen of another, which, however, must be of an allied species, hybridization being confined by the laws of nature within very narrow limits. See REPRODUCTION. A very interesting subject of philosophical inquiry is that of insect fertilization of plants. Naturalists have long been aware of the fact that pistillate flowers, whether growing on the same trees with the staminate, or on different trees (monecious or dioecious), owe their fertilization to the agency of insects, which carry the pollen from the staminate to the pistillate flowers. Nearly all such plants have flowers which secrete a nectar attractive to insects, and this has been regarded as one of the numerous evidences of the agency of a designing providence; but still stronger evidence, if possible, is furnished by the fertilization of *perfect* flowers by insects. It has generally been thought that flowers bearing both stamens and pistils were always self-fertilizing, but this is not the case with many kinds. There is a provision by which several plants are prevented from in-and-in breeding, the parts of the flower being so arranged that it is impossible for the pollen to come in contact with the stigma. This is the case, among others, with the numerous family of *orchids*; and one of the most interesting works upon the subject was written by the advocate of the *Origin of Species by Natural Selection*, in which there is conclusive evidence that provision has been made, not only with the evident design of preventing self-fertilization, but also with the design of attracting the insect, which is made the agent of the fecundating act. (See *Fertilization of Orchids*, by Darwin; of *Flowers*, Müller.) For the purpose of more perfectly insuring cross fertilization, in some flowers, the stamens precede the female organ in development, and shed their pollen before impregnation can take place, leaving the fertilization to be accomplished by the agency of insects, which carry the pollen from other flowers not so forward in development.

FEDERAL GOVERNMENT (Lat. *federatus*, bound by treaty, from *fœdus*, a treaty). When several states, otherwise independent, bind themselves together by a treaty, so as to present to the external world the aspect of a single state, without wholly renouncing their individual powers of internal self-government, they are said to form a federation. The contracting parties are sovereign states acting through their representatives; and the extent to which the central overrules the local legislature is fixed by the terms of the contract. In so far as the local sovereignty is renounced, and the central power becomes sovereign within the limits of the federated states, the federation approaches to the character of a union; and the only renunciation of sovereignty which a federation as such necessarily implies, consists in abandoning the power which each separate state otherwise would possess of forming independent relations with foreign states. "There are," says Mr. Mill, "two different modes of organizing a federal union. The federal authorities may represent the governments solely, and their acts may be obligatory only on the governments as such, or they may have the power of enacting laws and issuing orders which are binding directly on individual citizens. The former is the plan of the German so-called confederation, and of the Swiss constitution previous to 1847. It was tried in America for a few years immediately following the war of independence. The other principle is that of the existing constitution of the United States, and has been adopted within the last dozen years by the Swiss confederacy. The federal congress of the American union is a substantive part of the government of every individual state. Within the limits of its attributions, it makes laws which are obeyed by every citizen individually, executes them through its own officers, and enforces them by its own tribunals. This is the only principle which has been found, or which is even likely to produce an effective federal government. A union between the governments only is a mere alliance, and subject to all the contingencies which render alliances precarious."—*Representative Government*, p. 301, 302. One of the chief difficulties which arise in organizing a F. G., consists in discovering by what means disagreements between one or more of the local governments and the central government as to the limits of their respective powers, are to be disposed of. The arrangement by which this object was sought to be effected in America, of which M. de Tocqueville expressed his admiration, is thus explained by Mr. Mill: "Under the more perfect mode of federation, where every citizen of each particular state owes obedience to two governments—that of his own state, and that of the federation—it is evidently necessary not only that the constitutional limits of the authority of each should be precisely and clearly defined, but that the power to decide between them in

any case of dispute should not reside in either of the governments, or in any functionary subject to it, but in an umpire independent of both. There must be a supreme court of justice, and a system of subordinate courts in every state of the union, before whom such questions shall be carried, and whose judgment on them, in the last stage of appeal, shall be final. Every state of the union, and the F. G. itself, as well as every functionary of each, must be liable to be sued in those courts for exceeding their powers, or for non-performance of their federal duties, and must in general be obliged to employ those courts as the instrument for enforcing their federal rights. This involves the remarkable consequence, actually realized in the United States, that a court of justice, the highest federal tribunal, is supreme over the various governments, both state and federal, having the right to declare that any new law made, or act done by them, exceeds the powers assigned to them by the federal constitution, and, in consequence, has no legal validity."—(P. 305.) "The tribunals which act as umpires between the federal and state governments naturally also decide all disputes between two states, or between a citizen of one state and the government of another. The usual remedies between nations, war and diplomacy, being precluded by the federal union, it is necessary that a judicial remedy should supply their place. The supreme court of the federation dispenses international law, and is the first great example of what is now one of the most prominent wants of civilized society, a real international tribunal. Mr. Mill's confidence in this remarkable tribunal, in which De Tocqueville shared, was disappointed. It proved not equal to the strain on the constitution caused by the political jealousies which in 1860 culminated in the great secession war. Even in extraordinary circumstances, there is no reason to question its value in vindicating either federal or state rights.

A federal government, then, is a body-politic composed of the people of several different and in some respects independent states, over which, in its own prescribed sphere, it exerts a supreme authority; while outside of that sphere the states and the people thereof are sovereign within their respective jurisdictions. The character of a federal government varies with the extent of its powers. The first form of "federal government" established in this country was that of the "Articles of Confederation," adopted during the war of the revolution, July 9, 1778. The separate colonies, finding some form of central government indispensable to the efficient prosecution of the war of independence, gave a reluctant consent to those articles, which, while the war lasted, and all felt the presence of a common danger, worked tolerably, though not without some embarrassing friction arising from notions of colonial or state sovereignty. But after the independence of the country was established, and the pressure of a common danger no longer existed, there was a disposition to exalt the state, and to depreciate the national authority, which to some extent was regarded as a burden. The national government had no judicial tribunal to make an authoritative exposition of its powers, and no executive officers to enforce its decrees; it was entirely dependent upon the voluntary action of the states for means to carry on its operations; so that, in the language of Washington, it was "little more than a shadow without the substance," and "congress a nugatory body, their ordinances being little attended to." There was, in short, an utter want of all coercive authority on the part of the government to carry into effect its own constitutional measures. The embarrassments growing out of this state of things were endured till 1787, when a convention of delegates from the several states was held in Philadelphia "for the purpose of revising the articles of confederation and reporting to congress and the several legislatures such alterations and provisions therein as shall, when agreed to in congress and confirmed by the states, render the federal constitution adequate to the exigencies of the government and the preservation of the union." The convention encountered many difficulties arising from diversities of opinion among its members, and from conflicting local interests, but finally succeeded in framing a constitution which the people of the several states finally ratified, and which, with various amendments, has continued to this day. From the time of its adoption different theories of interpretation have prevailed, and these conflicting theories, to a greater or less extent, have determined the character and aims of political parties. It has been contended on the one side that the union was merely a league between the several states in their organized capacity, and that each state had the right, at its pleasure, of withdrawing therefrom. On the other side it has been held that the union, instead of being the creation of the states, as such, was formed by "the people of the United States," acting indeed through their respective state organizations, but still as citizens of a common nationality. According to this theory no right of secession on the part of a state has any existence, but it is the right and the duty of the national government to maintain the union by force. This question was brought to an issue in the late civil war, the slaveholding states seeking to exercise the assumed right of secession for the protection of slavery, and the non-slaveholding states taking up arms for the defense of the union. The results of the war are generally regarded as a vindication of the anti-secession theory, though there are still some disputed questions as to the relative powers of the national and state governments.

Another example of federal government is afforded in the Dominion of Canada, founded in 1867 by a union of the provinces of Canada West, Canada East, New

Brunswick, and Nova Scotia, and afterwards enlarged by the addition of the provinces of Manitoba and British Columbia, the Northwest Territories, and Prince Edward Island. These provinces have each its local legislature, while the government of the Dominion, essentially like that of the American union, extends over the whole territory. The government of the Dominion is administered by a governor-general appointed by and representing the British crown and exercising his authority with the aid of a council appointed by himself. The parliament consists (1891) of a senate of 80 members, who are nominated for life by the governor-general; and a house of commons of 215 members, chosen by and representing the people of the several provinces. The different cantons of Switzerland are united under a common government in a similar way.

FEDERALIST, THE, a collection of essays in favor of the new constitution of the United States, with the exception of the concluding nine of the eighty-six numbers, originally published in *The Independent Journal*, a semi-weekly newspaper printed in New York, between the 27th of Oct., 1787, and the 2d of April, 1788. The authors were Alexander Hamilton, James Madison, and John Jay, who addressed themselves over the common signature of "Publius" in a series of letters "To the People of the State of New York," with the avowed purpose of securing the accession of that state to the constitution as proposed by the federal convention of Sept. 17, 1787. The essays have often been reprinted in a volume.

FEDERALISTS, the earliest political party organized in the United States after the achievement of liberty. The leaders were Washington, Adams, Hamilton, Jay, Marshall, and others of their rank and ability. In the French revolution, the federalists sympathized rather with England than with the party of Marat and Robespierre; and this gave occasion to Jefferson, who was ambitious to be president, to organize, in connection with Burr and others, a party called "republican," whose distinctive features were to intensify the natural feeling against England, and to accuse the federalists of being enemies of the masses of the people, of favoring an aristocratic government, and even of designs against the newly achieved liberties of the nation. The federalists had their own way in the elections for the first three terms, electing Washington twice and John Adams once; but in the canvass of 1796, Jefferson and Burr were the republican candidates. At that time, no discrimination was made by the electoral college between president and vice-president; each elector voted for two persons, the man having the highest vote took the first office, and the other went to the next highest. The vote was: Adams, 71; Jefferson, 68; Pinckney (fed.), 59; Burr (rep.), 30; with 46 votes scattered among nine others. Thus, we had a federalist for the first and a republican for the second officer. In 1800, Adams was again a candidate, with C. C. Pinckney (fed.), and Jefferson and Burr (rep.) opposed. The electoral vote showed for Jefferson, 73; Burr, 73; Adams, 65; Pinckney, 64. There being an equal vote between Jefferson and Burr, the house of representatives was compelled to elect, and the vote was taken by states. After 36 ballots, Jefferson got 10, and Burr 4 states, and two states voted blank. So Jefferson took the first office. In subsequent elections, the federalist candidates for president were Charles C. Pinckney in 1804 and 1808, De Witt Clinton in 1812, and Rufus King in 1816. Clinton had the largest electoral vote, 89 to 128 for Madison. In the struggle with England, the federalists were charged with hostility to the war; and with some show of reason. The capitalists and merchants of the country were chiefly of that party, and capital always dreads the disturbance of war. Although weak in votes they were strong in social and political position and influence, and were a constant source of fear to the more popular republicans. In 1814, the federalists committed suicide as a party by holding the famous Hartford convention, the motives and actions of which were construed, though unjustly, yet not unnaturally, to be directly opposed to the war, and little short of treasonable. In fact, the convention was opposed not to the war, but to the manner in which it was conducted, and to acts of the administration which they deemed oppressive and unjust to the New England states. See **HARTFORD CONVENTION**. The unmeasured denunciation of this convention overwhelmed what there was left of the old federal party, and it speedily passed out of consideration as a national organization. In the succeeding presidential election (1816), Rufus King got but 34 out of 221 electoral votes, and only three (Massachusetts, Connecticut, and Delaware) of the 19 states. The last appearance of a federalist candidate for president was in 1820, when their leader, John Quincy Adams, received one electoral vote (from New Hampshire) out of a total of 235.

FEDERAL THEOLOGY is the result of efforts to compress the doctrines of Christianity within the bounds of certain covenants conceived of as made between God and men. The essential idea of an ordinary covenant (q. v.) a mutual compact between two parties by which each engages to render some benefit to the other—is indeed shut out by the nature of the case. When God and men are the parties, the benefit distinctively comes from him and the obligation distinctively rests on them. If the relationship exist between them, it must be determined and imposed by his sovereign right as a ruler. Yet it is more than a law or a promise. It includes a law to be obeyed, but the benefits far transcend the merit of the obedience. Mutual consent and obligation also are, in some sense, implied, as, on the one hand, God graciously binds himself to fulfill certain promises, and, on the other, men consent to the arrangement when, understanding the conditions prescribed, they enter on a course of obedience. Those who find advantage in

adopting this method of expressing Scripture truth, generally speak of two covenants, the one of works, the other of grace. In both they see the same contracting parties—God and man; the same blessing to be secured—eternal life; and the same requirement of perfect obedience, but in the covenant of grace there is a dispensation of mercy, through the divine Mediator, which secures eternal life. I. The covenant of works, though nowhere in Scripture spoken of under that name, is thought to be referred to or implied. Some, indeed, think that it is expressly mentioned in Hosea vi. 7, which they translate, “They, like *Adam*, have transgressed the covenant.” The contrast and analogy which Paul traces between the first and second *Adam* would (they say) have no basis unless a covenant had been entered into with the one as well as the other. Several essential features of a covenant are (they think) to be seen in the constitution under which *Adam* was placed: 1. Eternal life was promised him on condition of his obedience; 2. He was constituted the representative of his race; 3. His powers were sufficient for the performance of the condition; 4. He would have secured eternal life for his descendants, as well as for himself, had he continued faithful; 5. The penalty of disobedience was death, natural, spiritual, and eternal, as each of these followed a forfeiture of a divine life. After a time (how long is not known) this covenant was broken on the part of man who, “being left to the freedom of his own will, fell from the estate in which he was created.” II. The covenant of grace is the name given, according to the view of these theologians, to God’s glorious appointment of salvation by grace. We may conceive of the race as fallen, and of a merciful provision being made by which a door is opened wide enough for all mankind to enter, with a system of means by which the actual salvation of a limited number will be secured. Or we may regard the eye of God as fixed first on a limited number of the fallen race, and for their sake alone providing an atonement, sufficient indeed for all men, but designed and efficient for the salvation only of that limited number. The latter is the aspect in which the covenant of grace is presented by some at least of its advocates. They suppose that God from eternity, anticipating the temporary character of the covenant of works, ordained another plan by which a portion of mankind would be saved from the ruins of the fall. Why he did not include the whole or a larger portion of mankind within the scope of his saving grace they prefer to leave where, they think, revelation leaves it—to the mere good pleasure of God. And, as the Bible speaks of some who were chosen in Christ before the foundation of the world, they infer that there must have been in eternity an agreement between the persons of the sacred Trinity, according to which a seed was given to the Son to serve him. Without ascribing to the transaction the technicalities of a human compact, they contend that something equivalent to it must have existed. And as men could not act for themselves, the Son of God acted for all those of whom he was to be the spiritual head. To constitute a natural ground for this headship, he was to become Man, uniting his divinity in one person with humanity. He would thus become the federal head of his spiritual seed (as *Adam* was of his natural descendants), and as such, acting as their representative, the Son would share with them the curse which the first sin brought on the human race, suffering even unto death in its most terrific form. Though these sufferings would not be the same as the doom which otherwise would have come on them spiritually and eternally, they are supposed to be of infinite value on account of his infinite dignity. They are indeed sufficient in objective worth to make expiation for any amount of sin in any number of worlds. They do actually confer innumerable benefits on all men. Through them pardon and salvation are offered to every one who hears the gospel: time, opportunity, and means of grace are afforded to all. But, it is agreed, all are not made partakers of salvation, and only a portion of mankind were eternally given to Christ. Plainly the success of his work was not left uncertain. A seed was secured to him by covenant; and it was with ultimate and supreme reference to these that he entered on his work. Such, it is declared, was the covenant of grace as formed in eternity. To this is to be added its accomplishment in time. The administrator of it is the Son of God himself, the mediator between God and man. He has power over all flesh, that he may give eternal life to as many as have been given him. He represented the divine ruler in all the merciful dispensations of which sacred history informs us. Although at different periods the outward forms of religion have been changed, the covenant of grace, which is the foundation of all, has always been the same. Believers before the flood, the patriarchs, *Job* and his friends, the Israelites under the Mosaic dispensation, looked for forgiveness under certain prescribed conditions, and for a city beyond the present world, whose builder and maker is God. All national restriction removed, and the Holy Ghost in his fullness given, the Christian dispensation is the ultimate form in which the covenant of grace will be administered. The Lord Jesus Christ will continue to be its head until the whole world is subdued unto him. Finally, the present economy of things will cease, the dead will be raised, the living changed, all men judged at Christ’s bar, and sentence passed on them according to their works. Then having obtained full possession of his kingdom, the Son will deliver it to the Father, either as indicating the close of his mediatorial office, or perhaps only in token of the completeness and loyalty of his work. It may be noted here that there is a form of theology which, recognizing the great facts of salvation by God’s eternal grace, and not denying that they may be made

to appear under terms of various covenants, deems it more natural and scriptural to set them forth under the terms of sovereign divine constitutions or ordinances.

FEE, or **FEUD**, was the term employed to designate an allotment of land granted by an over-lord to his vassal on condition of certain services to be rendered in return—as, for example, military service in time of war. Under the feudal system it was the characteristic and most prevalent tenure, and the word was used originally in contradistinction to *allodium*, or freehold, which implied absolute ownership without condition of service. Gradually, with the disappearance of the feudal system, the word acquired a different meaning, lost its original association with the idea of compensatory services, and came to denote simply the estate owned by a landowner. The word estate, however, is not used in its ordinary acceptation as the property itself, but in its purely legal sense of a landowner's interest in his land as to the nature and duration of his title. The term fee, when used without qualifying or descriptive expressions, is equivalent to “fee simple” and “fee simple absolute”; it is an estate of inheritance, passing directly to the heirs general of the owner if he dies intestate, subject to no restrictions or qualifications, and signifies the highest estate that can be held by any tenure. It may be created by deed and acquired by purchase. In the former case we notice some traces of the old feudal formalities in the survival of the requirement that the word “heirs” of the grantee shall invariably be used in the deed conveying a fee simple; otherwise the interest conferred is held to be simply a life-estate. The stringency of this rule has in some instances been relaxed, and a few of our states, in consideration of its arbitrary character, have abolished it altogether. It does not apply to wills, for here it is the purpose of the law to seek out the true interest of the testator as discernible from the will as a whole, without such precise regard to the terms in which it is expressed, nor is there such a requirement when a corporation is the grantee; and in case of corporation sole, the word “successors” is to be used for heirs. The proprietor of an estate in fee-simple enjoys the fullest rights of property over his estate, which he may alienate or burden at pleasure, and out of which he may grant estate of a lower kind, as for life or years. He is owner of the soil “a cælo usque ad centrum,” and is therefore entitled to every product of the land, as timber, etc., and to all minerals and other valuable productions found beneath the surface. On his death, the estate descends to his right heirs, except in the case of fees held by corporations, which descend to their successors in office.

Estates in fee inferior to fee simple are termed “base” or “qualified” or “determinable,” to indicate the existence of certain restrictions and limitations upon their use or inheritance. Of these there are various kinds. Thus, a *fee upon limitation* is when an estate is granted to be held until the occurrence of some uncertain event, upon which it reverts to the grantor; but if the event does not take place, to continue in the possession of the grantee and his heirs forever. Or there may be a *conditional limitation*, in accordance with which, if the specified event takes place, the estate is thereupon transferred to some third person. A *fee upon condition* is the interest in an estate pending the performance of some stipulated act on the part of the grantee.

A *conditional fee* was limited to a particular class of heirs, to the exclusion of others, as to a man and the heirs-male of his body. On failure of heirs-male of the body of the grantee, an estate of this kind reverted to the grantor or his heirs. By the statute *De Donis Conditionalibus* in the reign of Edward I., it was enacted that estates should be held *secundum formam doni*. Estates created under this statute and known as estates in *fee-tail* could therefore descend only in the line of heirs indicated by the deed, while a fee-simple goes to the heirs general who may be collateral relatives. At first the grantee was regarded as possessing a mere life-interest in the estate, and could not convey the fee-simple, but this rule was modified by introduction of legal fictions, such as by fines or recoveries, and finally it was premissible for the grantee to transfer the fee-simple by simple conveyance. Fee-tail estates have been of no importance in the United States since the revolution. Some states have abolished this system of tenure by statute; in some it is wholly unknown; while in others the conveyance of the fee-simple bars the entail. See **ALLODIUM**; **CONDITION**; **CONVEYANCING**; **ENTAIL**; **ESTATE**; **FEOFFMENT**; **FEUDAL SYSTEM**; **TENURE OF LAND**.

FEEJEE. See **FIL**.

FEE AND LIFE-RENT (in the law of Scotland)—the first of which is the full right of proprietorship, the second the limited right of usufruct during life—may be held together, or may co-exist in different persons at the same time. The settling of the limits of the rights which in the latter case they respectively confer, is of very great practical importance, and, from the loose way in which both expressions have been used by conveyancers, by no means free from difficulty. “In common language,” says Mr. Bell, “they are quite distinct; life-rent importing a life-interest merely, fee a full right of property in reversion after a life-rent. But the proper meaning of the word life-rent has sometimes been confounded by a combination with the word fee, so as in some degree to lose its appropriate sense, and occasionally to import a fee. This seems to have begun chiefly in destinations ‘to husband and wife, in conjunct fee and life-rent and children in fee;’ where the true meaning is, that each spouse has a joint life-rent while both live, but each has a possible fee, as it is uncertain which is to survive. The same

confusion of terms came to be extended to the case of a destination to parent and child — 'to A. B. in life-rent, and the heirs of the marriage in fee'—where the word life-rent was held to confer a fee on the parent. It came gradually to be held as the technical meaning of the word 'life-rent to a parent, with fee to his children nascituri,' that the word life-rent meant a fee in the father. Finally, the expression came to be held as strictly limited to its proper meaning by the accompanying word 'allennarly,' or some similar expression of restriction; or where the fee was given to children nati and nominati; there being in that case no necessity to divert the word life-rent from its proper meaning; or, on a similar principle, where the settlement was by means of a trust created to take up the fee." (*Prin.* s. 1712.)

FEELING. See EMOTION.

FEES. Neither barristers nor physicians could recover their fees by legal proceedings against their clients or patients, except under a special contract. The ground of this rule was that they are regarded not as payment, but as an expression of gratitude for services the value of which cannot be appreciated in money. The origin of the rule in the case of the advocates, is traced to the relation which subsisted between patrons and their clients in ancient Rome. When the former appeared as the defenders of the latter, they practiced, as Blackstone says (iii. 29, Kerr's ed.), *gratis*, for honor merely, or at the most for the sake of gaining influence; and so likewise, it is established with us that a counsel can maintain no action for his fees, which are given, not as *locutio vel conductio*, but as *quiddam honorarium*; not as a salary or hire, but as a mere gratuity, which a counselor cannot demand without doing wrong to his reputation. The rule at Rome was maintained even under the emperors, and Tacitus mentions (*Ann.* lib. ii. c. 5) that it was directed by a decree of the senate that these *honoraria* should not in any case exceed 10,000 sesterces, or about £80 of English money. It has further been decided in England, that no action lies to recover back a fee given to a barrister to argue a cause which he did not attend (Peake, 122). But special pleaders, equity draftsmen, and conveyancers, who have taken out certificates to practice under the bar, and therefore are not counsel, may recover their reasonable charges for business done by them (Poucher v. Norman, 3 B. and C. 744). Another rule with reference to the fees of barristers and advocates is, that they are paid before they are earned; a rule which, by removing from its members all pecuniary interest in the issue of suits, has done much to maintain the independence and respectability of the bar. As regards physicians, the rule that a fee could not be recovered by an action at law, was applied in the case of Chorley v. Bolcot, June 30, 1791 (4 T. R. 317). If, however, either a barrister or a physician acted under a special agreement or promise of a certain payment, then an action might be brought for the money. But all medical practitioners were relieved from the above code of honor by the act of 21 and 22 Vict. 90, which applied to the United Kingdom, and enabled them to recover in any court of law their reasonable charges as well as costs of medicines and medical appliances used. This rule applies to physicians, surgeons, and apothecaries as defined by the statute. Members of the inferior branches of both professions—attorneys, solicitors, etc., on the one hand, and surgeons, dentists, cuppers, and the like on the other—were always entitled to raise action for their fees. In Scotland, the same rules prevail as in England with reference to both professions. In France, though the delicate sense of honor of the bar has always been preserved with quite as much care as in England, the rule is somewhat different. In law, an action for the recovery of fees would be maintainable in that country by an advocate; but "in Paris, the rule of the ancient bar, founded on the disinterestedness which was its characteristic, and according to which any judicial demand of payment of fees was strictly forbidden under pain of erasure from the table (of advocates), has been religiously preserved." There is no law in the U. S. which puts contracts for services by lawyers or physicians on any different basis from contracts made by other persons. These contracts are almost always, in the case of legal services, by special request. That is, there is usually a particular request to perform the service, though this is not always necessary. If there is a special sum fixed as the amount of the charges, this would be the sum sued for, otherwise the action would be for the reasonable value of the services. The same would be true of physicians. Wherever there is a request for the performance of a service there is an implied promise to pay for that service what it is reasonably worth; and that amount, in the absence of some understanding to the contrary, can be recovered from the client or patient.

FEHÉRVÁR (SZÉKES), the same as the Latin *Alba Regia*, or the German *Stuhlweissenburg*, is one of the most ancient royal free towns of Hungary, situated in a marshy district about 40 m. s.w. of Pesth. Under the Árpadian kings, it was the metropolis of the realm, and the residence of the sovereigns, who have been often crowned and buried there. On many occasions, the diets also were held in F., where twelve kings—among which are St. Stephen, and the great Mathias Corvinus—lie buried. It is the seat of a bishop, and contains a pop. of (1880) 25,612, chiefly Roman Catholics, and all of the Magyar race. Water is supplied by an artesian well.

FEHMIC COURTS, or **VEHMGERICHTE**. See **FEMGERICHTE**.

FEIA, a large lake of Brazil, lies on the maritime border of the province of Rio Janeiro, and is distant 150 m., to the n.e., from the city of the same name. It is so near to the Atlantic that it has been connected with it by means of a canal. F. is about a degree to the n. of the southern tropic.

FEIGNING OF DISEASE is much practiced in the army and navy, and also by convicts and others anxious to escape from discipline, or procure a discharge from compulsory service. In the army, it is technically called *malingering*. The detection of feigned disease, of course, necessarily belongs to the highly educated physician, and is impossible without a thorough knowledge of the reality, unless, indeed, the imitation be very coarse and badly studied. The diseases most commonly simulated are epilepsy, cataplexy, convulsions, blindness, deafness, palsy, insanity, indigestion, neuralgia, rheumatism, palpitation of the heart, and generally all disorders which may exist without leading to any distinct external appearances. Ulcers of the legs, however, have often been made, and kept open artificially through the application of irritant substances; and vomiting or coughing up of blood is very easily simulated, if the supposed patient can get access to the necessary materials in the slaughter-house or elsewhere. The detection of such impostures is easy or not according to the opportunities and knowledge and skill of the deceiver, as compared with those brought to bear on the discovery of the fraud. Many men in the public services, and women affected with hysteria, have become so expert as to deceive even men of high character and skill. The writer has known of an instance in which a man submitted to successive amputations of the arm upwards nearly to the shoulder, for an ulcer produced and kept open at will by local applications; and a case was some time ago recorded by Dr. Murchison in the *Medico-chirurgical Transactions*, in which there is no reasonable doubt that a large opening into the stomach was the result of caustic substances deliberately applied to the abdomen, with the view of exciting sympathy.

FEINT (from the Fr. *feindre*), in military or naval matters, a mock attack or assault, usually made to throw an enemy off his guard against some real design upon his position. See **FENCING**.

FEITH, RHLJNVIS, a distinguished Dutch poet, who ranks next to Bilderdijk (q.v.) as a reviver of the national poetry, was b. 7th Feb., 1753, at Zwolle in Overijssel, studied law at Leyden, and returned to his native town in 1776, where he held the office of burgo-master. He died 8th Feb., 1824. F. tried almost all kinds of poetry. In his earlier productions, he showed an excessive inclination for the sentimental; but in 1792 appeared his *Het Graf* (The Tomb), a didactic poem, which, though not free from the weakness referred to, is yet on the whole happily conceived, and contains some admirable passages. His *De Ouderdom* (Old Age), published in 1802, is deficient in plan. Among his lyrical pieces, *Oden en Gedichten* (Odes and Miscellaneous Poems, 4 vols., Amst. 1796-1810), are several marked by a high enthusiasm and warmth of feeling. Of his tragedies, the best known are *Thirza* (1791); *Johanna Gray* (1791); and *Ines de Castro* (1793). Along with Bilderdijk, he recast in a nobler form Haren's famous patriotic poem, *De Geuzen* (Les Gueux, or the Beggars), which celebrates the first struggles of the Dutch for independence. Of F.'s prose works, the most important are *Brieven over verscheiden Onderwerpen* (Letters on Different Subjects, 6 vols., Amst. 1784-90). These letters, by their polished style and refined criticism, did much to improve the literary taste of Holland.

FEKE, ROBERT, abt. 1725-69; b. Long Island, N. Y.; one of the earliest of American artists, his portraits dating back to about 1746. He settled in Newport, R. I., but visited Philadelphia, New York, and other cities professionally. It is said that when young he was made a captive and taken to Spain, where he employed himself in making sketches, from the proceeds of which he was enabled to return home.

FELANITCHE', or **FELANITZ** (anc. *Canatix*), a t. of the island of Majorca, 27 m. e.s.e. from Palma. It is situated in a valley, surrounded by mountains, and is well built, with a number of squares and wide streets. On a neighboring hill is an ancient Moorish castle, with subterranean vaults. There is some trade in the products of the neighboring country—rice, coffee, sugar, wine, brandy, fruit, and cattle. Its port is Puerte Colon with a safe but shallow harbor. Wine is exported to some extent. Pop. '87, 12,053.

FELDKIRCH, the chief t. in the Vorarlberg district, Tyrolean Austria, at the junction of the valleys of the Rhine and the Ill, $6\frac{1}{2}$ m. above the confluence of the two rivers; pop. '91, 3811. It is a place of considerable trade, and has manufactures of cotton, ribbons, etc. It is the seat of a bishop, and has a Jesuit seminary and a Capuchin monastery. Near the place are the ruins of the castle of Schattensburg, where the counts of Montfort had their seat.

FELDMANN, LEOPOLD, a German writer of comedies, was b. at Munich in 1802, of Jewish parents, to whose faith he remained attached. Apprenticed in 1815 to a saddler, and afterwards to a cobbler, he soon gave evidence of his determination to be a poet, by sending, in a pair of shoes which he had mended, a poetical expression of his devotion to their fair wearer. For this his master sent him back to school, where in 1817, when only 15 years old, he wrote a play, *Der Falsche Eid* (The False Oath), which was actually

produced on the stage. After spending a few years in business at Pappenheim, and subsequently in Munich, he was induced, by the reputation which he gained from some humorous pieces, entitled *Genrebilder*, to devote himself entirely to literature. In 1835, his *Höllen-lieder* (Hell-Songs) appeared; and his first comedy, *Der Sohn auf Reisen* (The Son on his Travels), was acted in Munich with applause. While traveling thereafter for five years, chiefly in Greece, he wrote "Pictures of Travel" for Lewald's *Europa*, and the correspondence for the *Allgemeine Zeitung*. In 1841, his comedy was produced in Vienna, and after 1850, he was employed as the histrionic teacher in the national theater of that capital. F.'s works, which are numerous, are reckoned among the best specimens of modern German comedy, pleasing by their cheerful humor, and happy employment of contemporary ideas and events, though complained of as deficient in artistic finish. F. published a collection of his comedies *Deutsche Originaltrustspiele* (Original German Comedies), 1844-53; new series, 1855-57. He d. 1882.

FELDSPAR (Ger. *feldspath*, field-spar), a mineral extremely abundant in almost all parts of the world. It is a principal constituent of many rocks, as granite, gneiss, greenstone, trachyte, etc.; and clays seem very generally to have resulted, at least in great part, from its decomposition. It occurs both massive and crystallized, in rhomboidal, pyramidal, and prismatic crystals, often having their edges and angles truncated, and thus very variously modified. There are many different kinds of F., which mineralogists have recently attempted to arrange in mineral species, distinguished by physical and chemical characters, and also by geognostic position, and by the groups of minerals with which they are associated. For these mineral species new names have been invented, *orthoclase*, *oligoclase*, *albite*, *labradorite*, etc. All the feldspars are anhydrous silicates of alumina, and of an alkali or lime. Orthoclase, and the other more silicious feldspars containing potash, abound chiefly in granite and the *plutonic* rocks; the less silicious, containing soda and lime, characterize the *volcanic* rocks—"as labradorite the basaltic group, glassy feldspar the trachytic." All the kinds of F. are so hard as not to be easily scratched with a knife, and are fused with difficulty. Some of them are soluble, some insoluble in acids.—The kind known as COMMON F.—referred to *orthoclase*—is generally white or flesh-colored, has a glassy and somewhat pearly luster, is translucent at least on the edges, and has an uneven or splintery fracture. Crystals four or five inches long are found in Aberdeenshire. This variety, under the name of *petunse* or *petuntze*, is used by the Chinese in the manufacture of porcelain; along with some of the quartz which is associated with it in the rock. It is used, with other materials, as a flux; and alone to form an enamel or glassy covering, without which the porcelain would absorb moisture and grease, and would be unfit for any except mere ornamental purposes.—**ADULARIA** is a transparent and almost colorless variety of F., often cut as an ornamental stone, the finest varieties, of which one is known as MOONSTONE, being prized almost as gems. A variety, found among rolled stones in Ceylon, and remarkable for the reflection of a pearly light, has been sometimes confounded with *cat's eye*.—**AVANTURINE F.** is similar to the variety of quartz called *aventurine* (q.v.) in the play of light which it exhibits, and which is said to be owing to minute crystals of specular or titanite iron. It is much esteemed as an ornamental stone. A variety with golden yellow specks, called SUNSTONE, is very rare and very beautiful: it sells at a high price.—**LABRADORITE** exhibits rich colors and a beautiful opalescence, on account of which it is much used for ornamental purposes.—A blue variety of F., found only in Styria, and a green variety, sometimes called *amazon stone*, are also esteemed as precious stones.—All the finer varieties of F. are characterized by a soft beauty, which well compensates for the want of that brilliancy which belongs to the true gems.

Kaolin, or *porcelain clay*, is regarded as a decomposed feldspar.—To F. also are referred, as chiefly composed of it, or apparently derived from it, felstone, trachyte, claystone, clinkstone, pitchstone, obsidian, and pumice.

FELEGYHA'ZA, a t. of Little Cumania, Hungary, is situated on the railway between Pesth and Temesvar, 67 m. s.e. from the former. It has an extensive trade in grain, fruit, wine, tobacco, and cattle. In the neighborhood, several Roman urns have been found. Pop. '90, 30,326.

FELICE, FORTUNATO BARTOLOMMEO DE, 1723-89; an Italian author; studied in Rome and Naples under Jesuit teachers. Having abducted a nun from a convent he fled to Switzerland, settled at Berne, and became a Protestant. He subsequently founded a school and a printing-office at Yverdon, where he published a literary periodical and some political works. His chief work was an *Encyclopædia* in 48 quarto vols. with 10 vols of illustrations, in which he was assisted by Euler and others.

FELICITAS, SAINT, a Christian martyr who with her seven sons suffered death in the 2d century. All were arraigned together, and all refused to renounce Christianity. The mother was beheaded, and the sons were killed in various manners. Another St. Felicitas suffered death with St. Perpetua under Caracalla about the beginning of the 3d century.

FELICU'DI. See LIPARI ISLANDS.

FELIDÆ, or **FELINÆ**, a family of digitigrade carnivorous quadrupeds (see CARNIVORA and DIGITIGRADA) corresponding to the genus *felis* of Linnæus, and sometimes

collectively called *cats* or the *cat tribe*. They are, generally speaking, the most carnivorous of all the *carnivora*, holding the same relative place among quadrupeds that the *fulconidae* do among birds. Their organization is admirably suitable to their habits. They have a very lithe muscular frame; the body is rather long, and remarkably flexible; the limbs generally short. Few of the species possess much fleetness, but most of them excel in climbing and in leaping. When moving rapidly over the surface of the ground, they generally advance by a series of zigzag bounds, rather than by direct running. They are mostly inhabitants of forests, and many even of the larger species live much among the branches of trees, although some of the largest do not leave the ground. They all advance stealthily on their prey; which all of them kill for themselves, and devour in a perfectly fresh state, and generally whilst still warm and quivering. When they have approached within a sufficient distance, they complete the seizure by a spring, many of them uttering a roar or yell as they do so, and thus rendering their victory more secure by the consternation which paralyzes the object of their attack. Their movements are extremely noiseless, owing to the soft velvety pads with which their toes are provided. Their claws are strong, much curved, very sharp, and retractile; being withdrawn by special muscles and ligaments into sheaths when not in use, and their points even turned upwards, so that they are not blunted by unnecessary friction, and do not interfere with the movements of the animal by accidentally hooking objects which are in the way. The last bone (*phalanx*) and joint of the toe exhibit peculiarities requisite for the extension and retraction of the claws. The fore-feet have five toes, the hind-feet four. The head of the F. is characterized by great breadth of skull, whilst the muzzle is short, and sometimes even rounded; the jaws are moved by very powerful muscles, and the articulation of the lower jaw is such that it has no rotatory motion; the teeth also being so shaped, and those of the two jaws so fitting to each other, that they cut like scissors—the lower teeth shutting within the upper—and are not at all adapted to the trituration of food. There are six small incisors in each jaw, followed on each side by one very large canine tooth, adapted for prehension; and this by two premolars, or false molars, which, particularly in the lower jaw, are compressed and sharp-edged, their edges rising to a central summit, with inferior lateral cusps, so that flesh between them is subjected to a cutting action in various directions. Finally, there is on each side of each jaw one true molar, and in the upper jaw of many species, a second true molar. The crowns of all the teeth are covered with enamel. The tongue is rough, with horny papillæ directed backwards, by which it is fitted for cleaning the bones of the prey. The stomach is simple, the intestines short, and digestion rapid. The senses of sight and hearing are extremely acute; the eyes are adapted to seeing both by day and by night; the sense of smelling is also very acute, although apparently not equal to that of dogs; the sense of taste is supposed to be less acute; the bulbs from which the long whiskers arise appear to possess the sense of touch in great perfection, and the whiskers thus become useful in the progress of the animal through entangled thickets.

The F. agree so much in form and structure, that many naturalists still refuse to divide the Linnæan genus *felis*. None of the F. are gregarious. Almost all of them, when taken young, seem capable of domestication, but in general they are little to be trusted. The species are numerous. They are distributed over Europe, Asia, Africa, America, and the islands adjacent to these continents; but none are found in Australia, where their place is supplied by the carnivorous marsupial quadrupeds. The largest species are chiefly found in warm climates. No species is known to be common to the old and new worlds, although some are very nearly allied.

Vast numbers of the larger F. were brought from Africa and the east for those savage sports and shows in which the ancient Romans delighted. Five hundred lions were slain in five days at the opening of Pompey's theater, and five hundred panthers have been let loose at once in a similar Roman arena. The wealth of Indian princes has also been often spent in fights of such beasts.

The principal F. are noticed in separate articles, as LION, TIGER, JAGUAR, PUMA, LEOPARD, PANTHER, CAT, TIGER-CAT, LYNX, CHEETAH, OUNCE, CARACAL, SERVAL, OCELOT, etc.

FELIX (POPE) I.-IV.—**FELIX I.**, reckoned the 26th in the succession of popes, succeeded Dionysius in the see of Rome probably in the year 269. His pontificate is chiefly interesting as an early example of the relations of the Christian church to the Roman empire, and of the recognition by the state of the civil rights of Christians. In the pontificate of F.'s predecessor, Dionysius, Paul of Samosata, bishop of Antioch, had been deposed by a council held in that city. Paul having resisted the sentence, the matter was laid before F., Dionysius being now dead; and, as Paul held possession of the church and church buildings, the bishops were obliged to claim the interference of the emperor Aurelian, who was passing through Antioch on his return from Palmyra. Aurelian returned a decision which is often appealed to in modern controversy, to the effect that the buildings should belong to the person "to whom they should be adjudged by the bishops of Italy and Rome." F. afterwards suffered martyrdom in the persecution of the same emperor, Aurelian, probably in 274.—**FELIX II.** occupied the Roman

1888

1888

1888



RIMAU-DA-HAN
(*Felis macrocelis*)



OUNCE
(*Felis uncia*)



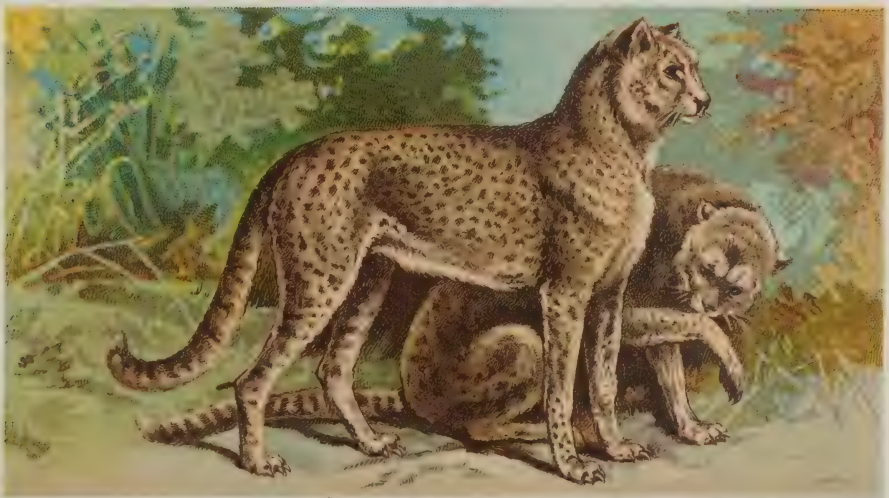
LION
(*Felis leo*)



LEOPARD
(*Felis pardus*)



TIGER
(*Tigris regalis*)



CHEETAH
(*Gueparda jubata*)

see during the banishment of Liberius, in 355. It is agreed on all hands that his first appointment was intrusive, but much diversity of opinion exists as to his subsequent career. In reply to a petition for the recall of Liberius, it was proposed by the emperor Constantius that Liberius and F. should exercise jurisdiction jointly; but this proposition was rejected by the Romans, and F. appears to have been compelled to retire from the city. According to the *Liber Pontificalis*, he suffered martyrdom in 365, at the hands of his former patron, Constantius; but this is not confirmed by any contemporary authority.—FELIX III. occupied the see of Rome from 483 till 492. He was a native of Rome, and of the family from which afterwards sprang pope Gregory the great. His pontificate is historically memorable, as presenting the first commencement of the disruption of the Greek and Roman churches. The contemporary occupant of the see of Constantinople, Acacius, as well as the imperial court, was a favorer of the Monophysite party, who refused to accept the decision of the council of Chalcedon. See MONOPHYSITES. By their influence, the patriarch of Alexandria was deposed, and replaced by the Monophysite, Peter Mongus. The deposed patriarch having appealed to Rome, F. sent two legates to Constantinople, to require his restoration; and the legates having failed in their trust, and Acacius still adhering to the heterodox party, F. assembled a council at Rome, and excommunicated not only the offending legates, but also Acacius himself, the sentence being pinned by a monk upon the back of the patriarch's robes while he was actually officiating in the church. F. had previously rejected the *Henoticon*, or decree of union, published by the emperor Zeno. The schism thus inaugurated was not healed till the year 519. The only literary remains of this pontiff are the letters and other acts of this controversy. He died Feb. 24, 492.—FELIX IV., a native of Benevento, succeeded John I. in 526. His pontificate presents no noteworthy event. He died in 530.—FELIX V. (anti-pope). See AMADEUS.

FELIX, ANTONIUS, a Roman procurator of Judea (51–62 A.D.) in the time of the apostle Paul, was a freedman of the emperor Claudius I. The circumstances under which he received his appointment are related differently by Tacitus and Josephus. His government, politically considered, was in some respects good. According to Josephus and other authorities, he cleared the country of robbers, and vigorously suppressed the chaotic seditions of the Jews; but his cruelty, lust, and greed were unbounded. His wife was Drusilla, a beautiful but renegade Jewess, whom he had induced to abandon her first husband, and to form a questionable connection with himself. It was therefore not at all wonderful that F. should tremble as Paul reasoned of "righteousness, temperance, and judgment to come" (Acts xxiv. 25). He was recalled to Rome, 62 A.D., on account of the accusations preferred against him by the influential Jews of Cæsarea, and narrowly escaped the sentence of death.

FELIX, ÉLISE RACHEL. See RACHEL.

FELIX, MARCUS MINUCIUS, a Roman lawyer and Christian, author of *Octavius*, a dialogue in defense of Christianity. He lived in the early part of the 3d century.

FELIXIANS, a Spanish sect of the latter part of the 8th c., so called from Felix, bishop of Urgel. See ADOPTIAN CONTROVERSY.

FELL, RT. REV. JOHN, Bishop of Oxford and Dean of Christ church, was born about 1625. During Cromwell's commonwealth he, with Wallis and two others, managed to maintain Church of England services, and at the Restoration he enjoyed the favor of Charles II.; was made canon and, later, dean of Christ Church, royal chaplain and D.D. He became bishop of Oxford in 1676, but retained his deanery, and died in 1686. He is best remembered by the well known lines,

"I do not like thee, Dr. Fell,
The reason why I can not tell,
But this I know and know full well
I do not like thee, Dr. Fell."

Tom Brown, when a student at Christ church, is said to have made this paraphrase from "*Non amo te Sabidi*," by Martial, but it is more likely to be rather his paraphrase of the version below, found in Thomas Forde's "*Virtus Rediviva*" (1661), "I love thee not, Nel! but why I can't tell."

FELLAH (plural EL FELLAHIN), an Arabic word meaning peasant or agriculturist, specially applied to the agricultural or laboring population of Egypt by the Turks, in a contemptuous sense, as "clowns," or "boors." They form the great bulk of the population, and are descendants of the ancient Egyptians, intermingled with Syrians, Arabs, and other races who have been converted to Islam. In their physical conformation and features, they differ among themselves, those of the northern provinces of the Mediterranean being of whiter hue, while at Assouan they are almost black. They are described as having a large skull, facial angle almost 90 degrees, oval face, arched eyebrows, deep eyes, projecting lips, large mouth, thin beard, short nose, large chest, and small belly; arched back, and small hands and feet, and being of mean height. They form the fourth class of the population, and are distinguished from the Bedouin or free Arabs, who have entered the country later than the Saracenic conquest, and the Arabs of the towns and villages. Their dress consists of a shirt and linen drawers, over which is a larger blue shirt (*herie*), girdled by a leather or stuff belt, which is exchanged in the

winter for a coat with sleeves (*zabout*). On their head, they wear the *tarboush*, turban, or a black or gray cap; the women tattoo themselves, and are nubile at an early age, being often married at 11 years, mothers at 12, and grandmothers at 24. The food of the Fellahin consists entirely of vegetables, which they eat in a crude state, dhourra bread, and beans. Even rice is too dear for them, and animal food unattainable. Their drink is limited to the waters of the Nile and coffee, and the only luxury which they enjoy is the green tobacco of the country; yet on this diet they are robust and healthy, and capable of much labor and fatigue. In their social position, they are inferior to the Bedouin, who, although they will marry the daughters of the Fellahin, will not give to them their own in marriage. They appear to exhibit the moral qualities of the ancient Egyptians, being intelligent, grave, and calm, docile, pliable, and sober on the one hand; and idle, jealous, quarrelsome, satirical, licentious, and of unbending obstinacy, on the other, and inherit the traditional hatred of their ancestors to the payment of taxes, which are often only extorted by the *bastinado*. Their political condition is most miserable. Each village is governed by a *sheik-el-beled*, who is responsible to the nazirs and mamours, or district officers, for the conduct of the inhabitants, and their due payment of taxes. So oppressive, indeed, is the taxation and extortion, scarcely $\frac{1}{10}$ of the produce falling to their lot, that it would not be possible for them to live if it were carried to a higher pitch, and none cultivate the lands with diligence unless compelled by their superiors.—Gliddon, *Types of Mankind*, p. 319; Lepsius, *Egypt and Ethiopia*, p. 76; Lane, *Manners and Customs of Modern Egyptians*, pp. 125, 126, 192, 193.

FELLATAHS, or **FOULAHs**. See **FULAHs**.

FELLENBERG, PHILIP EMANUEL VON, the founder of the institution for the improvement of education and agriculture at Hofwyl in the canton of Bern, in Switzerland, was b. at Bern in 1771. His father was a man of patrician rank, and in consequence, a member of the government. From him F. received a very careful education; but it was his mother, a great-granddaughter of the famous Dutch admiral, Van Tromp, who inspired him with the ardent desire of being useful to his fellow-creatures. In 1789, he went to the university at Tübingen, for the purpose of studying law, and subsequently traveled in various parts of Europe, taking up his quarters not in the hotels of the large towns, but in the cottages of the peasantry, that he might know at first hand the real condition and the manners of the poor, as well as the kind of education received by those whose life was to be spent in agricultural pursuits. When the revolution of 1798 broke out in Switzerland, F. took part in it for some time; but the faithlessness and want of public spirit on the part of the Bernese government induced him to withdraw from political life altogether, and to devote himself solely to philanthropic schemes. He now purchased the estate of Hofwyl, near Bern, and soon after entered into an alliance with Pestalozzi, the educationist. Their different characters, however, rendered such a union impracticable, and they found it necessary to separate. F. now proceeded with redoubled zeal to increase the produce of his estate by new improvements, to influence the neighborhood by his example, and to make his experiments known to the world by his agricultural treatises. At the same time, he founded an asylum for forsaken children. He also opened a school of theoretical and practical agriculture, and connected with it an institution for the education of the children of the higher classes. The establishment at Hofwyl acquired for its founder a very great reputation, and pupils hastened to it from all quarters. Many foreign princes visited it, and on their return to their own countries, founded similar institutions. In the year 1830, F. founded a school of art, and some years later, an infant school. He died 21st Nov., 1844. The institutions at Hofwyl were continued for some years by his son Wilhelm, and then entirely given up. Compare Hamm, *F.'s Leben und Wirken* (Bern, 1845).

FELLER, FRANÇOIS XAVIER DE, 1735-1802, Belgian author. He studied at the Jesuit school at Rheims. After the expiration of his novitiate he became a professor at Luxembourg, and later at Liège, where he continued to teach till the order of the Jesuits was suppressed, 1773. Thenceforth he gave himself up to study and travel. His chief work is *Dictionnaire historique et littéraire* (1781).

FELLOW-COMMONER, a wealthy or married undergraduate of Cambridge, Eng., who pays extra to dine at the "commons" or fellows' table. At Oxford they are called gentleman commoners.

FELLOWES, ROBERT, 1770-1847; b. England; graduated at Oxford; took holy orders in 1795; but soon afterwards left the established church, with whose doctrines he differed. His own views he gave in *Religion of the Universe*, 1836. Before this he had published *A Picture of Christian Philosophy*; *Religion without Cant*; *The Guide to Immortality*; *Manual of Piety adapted to the Wants and calculated for the Improvement of all Sects of Christians*; and *Body of Theology*. He was a liberal benefactor of the university of London.

FELLOWES, Sir THOMAS, 1778-1853, British naval officer, who commanded the "Dartmouth" in the British fleet at the battle of Navarino, Oct. 20, 1827. His attempt

to force a Turkish fire-ship to withdraw, was the immediate cause of that battle. He was knighted in the following year, and in 1847 became rear-admiral.

FELLOWS, Sir CHARLES, an antiquary of considerable reputation, was b. at Nottingham in 1799. In the beginning of 1838, he commenced those travels in the east by means of which his name has been brought so prominently into public notice. His researches were chiefly confined to the western peninsula of Asia Minor, and to the course of the ancient Xanthus, in the s. of that peninsula. Commencing his investigations at Patara, at the mouth of the Xanthus, and proceeding inland along the valley of that river, he discovered, only 9 m. from the coast, the ruins of the city of Xanthus, formerly the capital of Lycia. Fourteen or fifteen miles higher up the river, he met with the ruins of another city, which, from inscriptions, he found to be the ancient Tlos. Having made drawings of some of the fine remains of architecture and sculpture which he found in the ruins of these cities, and copies of some of the inscriptions, F. returned to England, and published *A Journal written during an Excursion in Asia Minor*, by Charles Fellows, 1838 (Lond. 1839). In 1839, he again visited Lycia, and in the course of another excursion, he discovered the ruins of no less than 13 cities, each of which contained works of art. Another journal, entitled *An Account of Discoveries in Lycia, being a Journal kept during a Second Excursion in Asia Minor* (Lond. 1841), was the result of this journey. In 1841, an expedition left England for the purpose of selecting works of art from the ancient cities discovered by F., who accompanied the expedition, and directed its operations. Authorized by a firman from the sultan, they made their selections, and returned in the spring of 1842. Another expedition sent out by the trustees of the British museum brought home 20 cases of marbles and casts in 1844. These remains have been deposited in the British museum in what has been called the Lycian saloon. In 1845, F.'s labors were rewarded by the honor of knighthood. The other works of F. are—*The Xanthian Marbles; their Acquisition and Transmission to England* (1843); *An Account of the Ionic Trophy Monument Excavated at Xanthus* (1848); a reissue of his earlier journals under the title of *Travels and Researches in Asia Minor, particularly in the Province of Lycia* (1852); and *Coins of Ancient Lycia before the Reign of Alexander; with an Essay on the Relative Dates of the Lycian Monuments in the British Museum* (1855). He died in 1860.

FELLOWS, JOHN, 1733–1808; b. Conn. He served in the French war, and was a member of the provincial congress in 1775. After the conflict at Lexington, he led a regiment to Boston, and subsequently commanded a brigade in the battle of Long island, and was in the engagements at White Plains and Bemis Heights. His highest rank was brigadier-general.

FELLOWSHIP. See PARTNERSHIP.

FELLOWSHIP, IN A UNIVERSITY. As the history of this institution will be treated under UNIVERSITY, we shall here only mention its leading characteristics, as it exists in the two great universities of England—Oxford and Cambridge. In these ancient and celebrated seats of learning, the fellowships were either constituted by the original founders of the colleges to which they belong, or they have been since endowed. In almost all cases, their holders must have taken at least the first degree of bachelor of arts, or student in the civil law. One of the greatest changes introduced by the commissioners under the university act of 1854, was the throwing open of the fellowships to all members of the university of requisite standing, by removing the old restrictions by which many of them were confined to founder's kin, or to the inhabitants of certain dioceses, archdeaconries, or other districts. Fellowships vary greatly in value. Some of the best at Oxford, in good years, are said to reach £700, or even £800, whilst there are others which do not amount to £100, and many at Cambridge which fall short of that sum. Being paid out of the college revenues which arise from land, they also vary from year to year, though from this arrangement, on the other hand, their general value with reference to the value of commodities is preserved nearly unchangeable, which would not be the case if they consisted of a fixed payment in money. The senior fellowships are the most lucrative, a system of promotion being established among their holders; but they all confer on their holders the privilege of occupying apartments in the college, and generally, in addition, certain perquisites as to meals or commons. Many fellowships are tenable for life, but in general they are forfeited should the holder attain to certain preferments in the church or at the bar, and sometimes in the case of his succeeding to property above a certain amount. In general, also, they are forfeited by marriage, though this disability may now be removed by a special vote of the college, permitting the fellow to retain his fellowship notwithstanding his marriage. With the single exception of Downing college, Cambridge, in which the graduates of both universities are eligible, the fellowships are confined to the graduates of the university to which they belong.

In colleges and universities in the United States the term "fellow" often means trustee; e.g., the official title of Harvard univ. is "the president and fellows of Harvard university." But many American colleges have fellowships corresponding to those in England. The candidate must usually be a graduate, generally of the college which gives the fellowship. Residence at the college is commonly required, though sometimes the student may study abroad. The fellowship gives a certain amount yearly for one or more years. Harvard univ. has 12 fellowships, varying in annual income

from \$600 to \$800, or more ; besides four graduate scholarships of \$250. Cornell univ. has seven fellowships of \$400 each, given for one and sometimes two years. Residence at the university is required. Princeton coll. has six fellowships, from \$250 to \$600. Johns Hopkins has 20 fellowships of \$500 each. Yale has three fellowships of \$600 each, for from three to five years. Columbia coll. gives twenty fellowships each of \$500 for three years. These will serve as examples. Similar peculiar pecuniary aids to undergraduate students are generally called scholarships, and are provided in many colleges.

FELO-DE-SE, one who voluntarily kills himself, commits suicide. He must have reached the age of discretion and be of sufficient soundness of mind to be able to appreciate the wrongful nature of the act. For fuller information see **SUICIDE**.

FELON. See **WHITLOW**.

FELONY. (The word felony is probably of feudal origin, but its exact etymology is doubtful. Some derive it from the Saxon word *feh*, "fee," "feif," or "feud," and the German word *lon*, "price" or "pay," thus making it mean the price of a fee, and thence the forfeiture or loss of one's land held in fee. Others regard it as having a common root with the Saxon *faelen* or *felen*, "to fail" or "to fall," thus denoting that the criminal failed in his fidelity or allegiance to his superior, or that his land fell back, by forfeiture, to his lord or to the crown.) The law has never made a classification of crimes which was based on their inherent nature, but has had reference in its divisions rather to the kind of punishment inflicted. Upon this basis, crimes were divided by the common law into *felonies* and *misdemeanors*. A felony was any crime punishable by forfeiture of the criminal's lands, or goods, or both. Blackstone adds that capital or other punishment might be superadded to the forfeiture, according to the degree of guilt, and in England, for a long time, most felonies were punishable by death. But at common law forfeiture was always an essential part of the penalty, and punishment by death was never the true criterion. In England important statutory changes in the laws as to forfeiture (33 and 34 Vict., ch. 23) have taken away the practical utility of the former test of a felony. But those crimes are still held to be felonies and misdemeanors respectively which were so when the test was operative. Many crimes have been expressly declared felonies by the statutes creating them. Even in the absence of such declaration all crimes for which by statute judgment of life or limb may be decreed, are there held to be felonies. In some of the United States the distinction between felonies and misdemeanors is practically discarded, the punishment for each particular crime being prescribed by statute, and the word felony, if used at all, being employed in a loose and indefinite sense. In the other States the distinction is retained by statute and made to depend on the kind of punishment. Thus, in a considerable number, statutes have declared that crimes punishable by death or by imprisonment in the state prison shall be felonious. In those states it is sufficient to constitute felony that those penalties *may* be imposed, though the court or jury may be given power to inflict a less severe punishment.

FELSING, JAKOB, b. 1802 ; a German engraver, a pupil of his father and of the Milan academy. He was noted for the accuracy with which he reproduced the peculiar characteristics of paintings which he engraved, some of which were Correggio's "Marriage of St. Catherine," Carlo Dolci's "Christ on the Mount of Olives," Raphael's "Violin Player," and Overbeck's "Holy Family." He d. 1883.

FELSPAR. See **FELDSPAR**.

FELSTONE, a name introduced by Prof. Sedgwick to designate those rocks which are composed, either in whole or to a large extent, of felspar. When they consist of a compact and apparently amorphous felspar, they are known as trachytes—a variety of this rock, which splits into small slabs, that ring with a metallic sound, is called phonolite. Trachyte, with distinct crystals of felspar scattered through it, becomes feltstone porphyry; when the rock is in a vitreous condition, and has a resinous luster, it is pitchstone. Even in the most compact felstones, minute crystals may be detected, and these sometimes increase in size, till we have varieties which are completely granular and crystalline.

FELT—FELTING, a fabric formed without weaving, by taking advantage of the natural tendency of the fibers of hair and wool to interlace with and cling to each other. The hatters' tradition concerning the invention of felt affords as good an illustration as any we can find of the principle of this manufacture. In most Roman Catholic countries, the hatters celebrate as a festival the 23d of November, St. Clement's day, as they formerly did in this country; and it is stated that St. Clement, when on a pilgrimage, put carded wool between his feet and the soles of his sandals, and found on his journey's end that the wool was converted into cloth. Although this tradition is very questionable, as the manufacture of felt is of far more ancient origin, there can be no doubt that if carded wool were thus continually trodden, and at the same time moistened, it would become felt, and all the manufacturer's processes of felting are but modifications of such treatment.

This matting or felting of the fibers of hair and wool results from their structure, for, when examined by the microscope, the hair of all animals is found to be more or less jagged or notched on its surface; in some animals it is distinctly barbed; and this

structure is so directed that the teeth or barbs all point towards the tip of the hair. See HAIR. If a piece of human hair (in which this structure is less marked than in most animals) be held between the finger and thumb, and rubbed in the direction of its length, it will invariably move between the fingers in the direction of its root; for the skin, while moving towards the tip of the hair, slides freely upon it, but moving in the other direction, against the inclination of the barbs, it brings the hair with it. It will be easily understood that when a number of hairs are pressed together, those which lie in opposite directions to each other and in contact will interlock at these barbs or teeth, and thus resist any effort to tear them asunder. When once this close contact and interlocking is established between any two or more hairs, they remain attached, but the others that are differently arranged, or not in contact, will still be free to move upon each other; and therefore, if subjected to continual blows, pushing, and pressure, like the treading of the feet in walking, the unattached hairs will be continually shifting until they reach others in suitable positions for clinging together, either by crossing obliquely or by lying in the same line, and overlapping at their ends or any other portion. When the hair has a natural tendency to curl, the felting is still more readily brought about by the additional interlacing. This is the case with wool to such an extent, that when free from grease it cannot be retained in the straight carded condition required for spinning and weaving. When it is required to be felted, the natural grease has to be removed. This tendency to felt is shown in the hard lumps formed in wool-mattresses that have been long used.

The beaver-hat maker produces his felt by taking a few ounces of the mixed fur, distributing it in an even layer by twanging a bowstring against the heap, and then condensing this into a felt by a sort of kneading process with his hands. See HAT.

The felt now extensively used for carpeting and other purposes is made by machinery, chiefly from the waste wool from the weaving-mills. Many patents have been taken out for the various details of felting machinery, but the main principle is the same in all. The wool is carded more or less perfectly, and steamed or moistened with hot water, and passed between beaters, which act like the pilgrim's feet in the manner already described. When used as drugget for covering carpets, or as a substitute for carpet, the felt is printed by means of blocks with various patterns, or simply dyed. Felt is also used for padding coats and other garments, sometimes for cloaks and capes; for table-covers, some of which are beautifully embossed and printed; for carriage linings, upholstery work, polishing cloths, pianoforte hammers, and various other purposes where a coarse or thick cloth is required. A simple kind of saddle, cut out of very thick felt, is in common use in South America.

The "felted sheathing" used as a non-conducting covering for retaining the heat in steam-boilers, is a substance intermediate between felt and paper, being composed of the commonest woollen refuse from paper mills, etc., made into a semi-pulp, and beaten to produce a partial felting. This when dried hardens, and though possessing but little tenacity, and unfit for the wear of friction, is, from its compactness, better adapted than ordinary felt for the purposes to which it is applied.

Asphalted roofing-felt is a very coarse felt saturated with pitch, asphalt, or coal-tar—usually the latter, on account of its cheapness; it is retailed at one penny per foot, and used for covering sheds and other buildings. A more expensive kind, free from coal-tar, is called *inodorous felt*, and used as a lining for damp walls upon which paper has to be hung. Asphalted felt is also used as a flooring for granaries and similar buildings, and has been recommended for public schools, to prevent the noise from the shuffling of the children's feet.

FELTON, CORNELIUS CONWAY, LL.D., 1807-62; b. Mass.; graduated at Harvard, 1827; and taught in Northampton, Mass., and at Geneseo, N. Y. In 1829, he was Latin tutor at Harvard; in 1830, Greek tutor; in 1832, he became Eliot professor of Greek; and in July, 1860, was inaugurated president. Among his publications were *Homer, with English Notes and Flaxman's Illustrations*; *Menzel's German Literature*; *Clouds of Aristophanes*; *Ancient Literature and Art*; *Poets and Poetry of Europe*; *Panegyricus of Isocrates*; *The Agamemnon of Æschylus*; and *Guyot's Earth and Man*. In 1853-54, he made a European tour; in 1855, he revised for publication Smith's *History of Greece*, with an edition of lord Carlisle's *Diary in Turkish and Greek Waters*. A selection from modern Greek writers was published by him. Other works of his were *Life of Gen. Eaton* in *Spark's American Biography*; addresses; and contributions to the *North American Review*. He was a member of the Massachusetts board of education, regent of the Smithsonian institution, and a member of the American academy of arts and sciences.

FELTON, JOHN, a native of Ireland who made himself conspicuous in 1628 by assassinating the duke of Buckingham (George Villiers), the favorite of James I. of England. Having been disappointed in his expectation of promotion and not receiving what was due to him, he eagerly caught at an excuse for revenging himself, and having read the declaration of the House of Commons, that Buckingham was a public enemy, he stabbed him as he left his breakfast room. He was hanged soon afterward, Nov. 28, 1628.

FELTRÉ, a t. of northern Italy, in the province of Belluno, is situated near the right bank of the Piave, 44 m. n.n.w. of Venice. It suffered severely from the attacks of the Goths in the 5th century. The chief buildings are the cathedral, the college, ecclesiastical seminary, and gymnasium. Pop. about 13,300.

FELTRE. An ancient kind of cuirass made of wool, thickly padded, to resist the blow of a sword. Probably derived from *felt*.

FELTRE, MORTO DA, an Italian painter who lived about the close of the 15th and opening of the 16th century. At an early age he went to Rome and investigated the ancient, especially the subterranean, remains, and thence to Pozzuoli, where he painted from the decorations of antique crypts or "grotte." The style of fanciful arabesque which he formed for himself from these studies gained the name of "grottesche," whence comes "grotesque;" not, indeed, that Morto was the first painter of arabesque in the Italian renaissance, for art of this kind had, apart from his influence, been fully developed, both in painting and in sculpture, towards 1480; but he may have powerfully aided its diffusion southward. His works were received with much favor in Rome. He afterwards went to Florence, and painted some fine grotesques in the Palazzo Pubblico. Returning to Venice towards 1505, he assisted Giorgione in painting the "Fondaco dei Tedeschi," and seems to have remained with him till 1511. If we may trust Ridolfi, Morto eloped with the mistress of Giorgione, whose grief at this transaction brought him to the grave. The allegation, however, is hardly reconcilable with other accounts. It may have been after 1511 that Morto returned to his native Feltre, then in a very ruinous condition from the ravages of war in 1509. There he executed various works, including some frescoes, still partly extant, and considered to be almost worthy of the hand of Raphael, in the loggia beside San Stefano. Towards the age of 45, Morto, unquiet and dissatisfied, abandoned painting and took to soldiering in the service of the Venetian republic. He was made captain of a troop of 200 men; and, fighting valourously, he died at Zara, in Dalmatia, in 1519, or perhaps somewhat later. One of his pictures is in the Berlin museum, an allegorical subject of Peace and War.

FELUCCA, a small class of vessel used in the Mediterranean. It is propelled by from 10 to 16 oars, and by lateen sails. It has frequently a rudder at each end, to be applied as occasion demands. During the French war, feluccas were armed with a heavy gun or two, and sent out as gun-boats against our ships, when becalmed near the Spanish ports; from their speed in smooth water, and the difficulty of hitting them, they were very troublesome antagonists.

FEMALE SHERIFF. There is only one instance on record of the office of sheriff in England having been held by a female; this was in the case of Anne, countess of Pembroke. This lady, who was distinguished during the rebellion in the reigns of Charles I. and II. by her staunch adherence to the royal cause, was the wife of Philip, fourth earl of Pembroke, and daughter of the earl of Cumberland. On the death of her father, without male issue, in 1643, she succeeded to the hereditary office of sheriff of Westmoreland, and in that character she attended the judges of assize, and sat with them on the bench at Appleby.

FEME COVERTE (*femina viro co-operta*). In the language of the law of England, a woman by her marriage becomes subject to her husband, who has the control of her person, and is entitled to fix her residence. This control in the husband is admitted to a certain extent in criminal cases to excuse a married woman from guilt. Thus, in any felony, except murder or manslaughter, committed by a married woman, in presence of her husband, it is assumed that she acted under his compulsion. But this presumption may be rebutted by evidence that she was the principal agent in the crime. A married woman cannot, in criminal cases, be a witness for or against her husband, except when he is tried for violence against her. In civil cases, a married woman may be examined in a suit where her husband is a party. In a petition for divorce on the ground of adultery, a married woman is not a competent witness; but where cruelty forms one of the grounds of complaint, she may be examined on that subject. Her property is to a limited extent transferred to the husband. By 7 Will. IV. and 1 Vict. c. 26, even a will made before marriage is revoked by the marriage. But a deserted wife may, by 20 and 21 Vict. c. 85, s. 21, obtain an order to protect any money acquired by her own industry. By 33 and 34 Vict. c. 93 (1870) it is possible for a woman to retain her personal earnings, and gifts made to her during marriage in her own right (see **HUSBAND AND WIFE**). The landed property of a married woman is, during the marriage, under the administration of the husband, and during their joint lives, he is entitled to all the profits of the lands. Should there be a child of the marriage born alive, and capable of inheriting the lands, he has, by the courtesy of England (see **COURTESY IN LAW**), an estate for life in all lands in which he is seized in fee in her right. Formerly, a married woman could not, during marriage, execute a conveyance of lands without levying a fine (q.v.); but by 3 and 4 Will. IV. c. 74, a married woman may now make a disposition of real estate as if she were a *feme sole*. But the husband must concur in the deed, which must also be acknowledged by the wife, in presence of one of the judges, a master in chancery, or of a commissioner appointed under the act. Formerly, an action could not be maintained by a married woman unless with the concurrence and in the name of the husband. A married woman may now maintain an action and other remedies in her own name, as regards her separate estate. A married woman cannot bind her husband by any contract she may enter into, but as he is bound to support her, he

is liable for necessities supplied to her while she lives with him, or if he willfully deserts her, but not where she has left him of her own accord. Formerly, a wife could not obtain a divorce from her husband; but by 20 and 21 Vict. c. 85, she may now obtain a divorce on the ground of adultery, coupled with cruelty or desertion. See DIVORCE. For the law of Scotland in regard to the rights of married women, see HUSBAND AND WIFE.

FEMERN, or **FEHMARN**, an island in the Prussian province of Schleswig-Holstein, taken from Denmark in 1864. It is separated from Holstein by a strait called the Femern sound, has an area of 61 sq. m., and a pop. of about 9,800. The island is flat, fruitful, and destitute of wood. Agriculture, fisheries, and stocking-weaving for exportation, form the principal employments of the inhabitants. It contains the towns of Burg, and Petersdorf, the former being the more important.

FEMGERICHTE (derived from the old German *fem*, punishment, and *gericht*, court of justice), spoken of as the holy feme (or fehme), and also known as the Westphalian or secret tribunals, were among the most remarkable phenomena of the middle ages, and supplied the place of the regular administration of justice, then in a deplorable condition. The origin of these courts has been ascribed to Charlemagne, who, it was pretended, had instituted them to prevent the relapse into paganism of the Saxons who had been forcibly converted to Christianity. It is more probable, however, that they were a relic of the ancient German free courts of justice, the preservation of which may have been favored in Westphalia by special circumstances.

When Henry the Lion was put under the ban of the empire, and deprived of his possessions in 1179, Westphalia, which then comprised nearly the whole district between the Rhine and the Weser, was granted to the archbishop of Cologne; and from this time the secret tribunals gained in importance. In the general confusion which then prevailed in Germany, when all laws, both civil and ecclesiastical, had lost their authority, and the fabric of society seemed on the point of toppling into ruins, the F. were organized for the purpose of arresting and controlling the incipient anarchy that threatened to bring chaos back again, and of inspiring with feelings of salutary terror, through the agency of their mysterious powers and solemn judgments, all rapacious and lawless persons (but especially the feudal barons) who—on account of the impotence of the ordinary legal checks—committed crimes with impunity. In the causes, therefore, which led to their formation, and in their general design, the F. resemble the Hanseatic towns. They soon acquired tremendous influence, the emperors themselves having recourse to their assistance against powerful and rebellious nobles. It was in the 14th and 15th centuries, however, that they attained the summit of their dread authority, when they began to extend themselves over the whole of Germany. Beneficial as in many instances F. proved to be, they could not fail, in the long-run, to degenerate, and to be frequently employed as a cloak to self-interest and malice. It is therefore by no means surprising that many voices were raised against them, and that in 1461 various princes and cities of Germany, as well as the Swiss confederates, formed unions for affording justice to every individual, and preventing any from seeking it from the secret tribunals. Particular classes likewise obtained imperial letters of protection against the pretensions of these tribunals. The emperors themselves, however, could go no further than to make some unavailing attempts to introduce improvements into the constitution of the F., as the latter were bold enough to oppose the imperial authority, and even summoned the emperor Friedrich III. to appear before them. Their influence came to an end only when the public peace (*landfriede*) was established in Germany, and an amended form of trial and penal judicature was introduced. The last real F. was held at Celle in Hanover, in the year 1568. A remnant of the institution, however, existed in Westphalia until the year 1811, at which time it was performing the function of a society for the suppression of vice, when it was abolished by an order of Jerome Bonaparte. Beyond the limits of Westphalia, notwithstanding all their endeavors, the F. never succeeded in fully establishing their authority: and even in the *Red Land*, as Westphalia was called (probably from the color of the soil), they were restricted by the imperial privileges on which they founded their authority.

The members of the feme were called *wissende*, "the knowing ones," or the *initiated*. It was necessary that they should be born in wedlock, be of the Christian religion, lead a blameless life, and bind themselves by a tremendous oath "to support the holy feme, and to conceal it from wife and child, father and mother, sister and brother, fire and wind, from all that the sun shines on and the rain wets, and from all that is between heaven and earth." Originally, none but an inhabitant of the "Red Land," possessed of real property, could be admitted a member of the *wissende*; at a later period, this rule was relaxed. From the general body were elected officers called *freischöffen* (free justices), who were assessors of the court and executors of its sentences. The presiding judge was called the *freigraf* (free count). The general superintendence and presidency of the secret tribunals belonged to the lord of the land, i.e., in Westphalia, to the archbishop of Cologne. The highest office, however, as supreme president, was nominally held by the emperor, who was usually elected into the number of the *wissende* on the occasion of his coronation at Aix-la-Chapelle. The court of a freigraf was called *freiding* (a free court of justice), and the place where he held court a *freistuhl* (free bench or court).

One of the most celebrated free courts had its seat at Dortmund. The sittings of the tribunal were either open or secret. The former were held by day in the open air, and decided in civil disputes; the secret tribunals took cognizance of those who had been unable to prove their innocence in the open courts, as well as of those who were accused of heresy, sorcery, rape, theft, robbery, or murder. The accusation was made by one of the freischöffen, who declared, upon oath, that the accused had committed the crime. The citation was secretly affixed, with symbolical signs, to the door of the accused, who was to meet the wissende at a certain hour and place, and be conducted by them before the tribunal. The accused could now clear himself by an oath, but the accuser and witnesses could oppose this with another. If the accused could now bring forward six witnesses to swear in his favor, the accuser could strengthen his oath with 14 witnesses; and it was not till after 21 witnesses had made their affidavit in his favor that sentence of acquittal necessarily followed. The persons convicted, as well as those who refused to obey the summons, were given over to the freischöffen. The first freischöffe who met him was bound to hang him on a tree, or, if he made any resistance, to put him otherwise to death. A knife was left by the corpse, to show that it was not a murder, but a punishment inflicted by one of the freischöffen. Compare Wigand, *Das Fehmgericht Westfalen's* (Hamm. 1825), and Usener, *Die Frei- und heimlichen Gerichte Westfalen's* (Frankfort, 1832); Geisberg, *Die Fehme* (1858).

FEMUR, the thigh-bone in human anatomy. In general terms, it consists of a shaft very slightly curved, and two extremities. The upper extremity bears two projections, called the greater and lesser *trochanters*, for the attachment of muscles, and a short *neck*, nearly at right angles to the shaft, terminated by a hemispherical *head*, which being received into a cavity of the pelvis called the acetabulum, forms the hip-joint, a ball-and-socket joint. The lower extremity of the femur has on each side an enlargement called a *condyle*, or knuckle. The articular surface of the condyles is hemicylindrical, as also is the somewhat depressed space between them, called the *trochela*, and with the large bone of the leg, called the *tibia*, forms a hinge joint. The femur is attached to the pelvis by two ligaments—a capsular ligament, which incloses the head and neck, and the *ligamentum teres*, a sharp ligament which joins the head with the bottom of the acetabulum. It is attached to the tibia by several ligaments, placed in different positions, to combine strength with freedom of motion, the most important of which are the lateral ligaments and the crucial ligaments. The crucial ligaments cross from one member of the joint to the other in oblique directions. Powerful extensor and flexor muscles, besides performing their ordinary functions, aid in keeping the parts in opposition. The femur has a wide range of distribution in the animal kingdom, and is not the exclusive property of warm-blooded animals. In man, it is the strongest, longest, and largest bone. In the whale, it is only rudimentary. In fishes, it is not represented, but has a varying importance in mammals, birds, reptiles, and amphibians. It is a short bone in the ruminants and horse family. In the tortoises, the curve is considerable, while it is almost straight in carnivora, bats, etc. In many reptiles it is slightly rudimentary.

FENCIBLE, a word, of doubtful origin, meaning defensive. Regiments raised for local defense, or at—and only for—a special crisis, used to be denominated “fencible.” In the last French war, the local, as distinguished from the general militia, was called fencible, and many of the volunteer corps styled themselves the “royal —shire fencible infantry.” The name is borne by a well-known military company in Philadelphia.

FENCING may be described, for a general definition, as the art of defending one's own body or assailing another person's in fair fight by the aid of a side-weapon—i.e., by a sword, rapier, or bayonet. Technically, F. is usually limited to the second of these; and works on the art touch only on attack and defense with the foil in pastime, and the rapier in actual personal combat. The present opportunity will, however, be taken to introduce the elements of single combat with foil, sword, and bayonet. The objection formerly existed that instruction in F. encouraged a propensity to dueling; but as that absurdest of absurd customs has entirely ceased—at least in Britain—to demand its annual victims, no such objection now holds. F. may therefore be safely learned and taught as an elegant and manly accomplishment, developing gracefulness and activity, while it imparts suppleness to the limbs, strength to the muscles, and quickness to the eye. This regards F. with the foils (the rapier has disappeared with the duels which employed it); but instruction in F. with the sword and bayonet, while conferring the same advantages, has in addition the recommendation of helping to fit the student for taking an active part in any general national defense that political circumstances might render necessary. The foil (q.v.) is a circular or polygonal bar of pliable and very highly tempered steel, mounted as any other sword, and blunted at the point by a “button,” to prevent danger in its use. From its nature, the foil can only be employed in thrusting, and, being edgeless, it can be handled without liability to cutting wounds. The length of the blade should be proportioned to the height of the person using it—31 in. being the medium length for men, and 38 in. from hilt to point the maximum allowable. As a protection against accidental thrusts, the face is generally guarded by a wire-mask. The two portions of the blade are known as the “forte”

and the "feeble;" the first extending from the hilt to the center, and the other from the center to the point.

In drawing, advance the right foot slightly to the front, take the scabbard with the left hand, raise the right elbow as high as the shoulder, seize the hilt with right hand, nails turned inward, and having drawn the foil, pass it with vicacity over the head in a semicircle, and bring it down to the guard (of which presently) with its point towards the adversary, not higher than his face, nor lower than his lowest rib. Simultaneously with the weapon being brought into position, the left hand with fingers extended should be raised to a level with the head, as a counterpoise in the various motions to ensue. In establishing the position of guard, the right foot must be advanced 24 in. before the left, the heels in a straight line, and each knee slightly bent, to impart elasticity to the movements, but not too much, lest the firmness of the position be diminished.

In F., there are three openings or entrances—the *inside*, compromising the whole breast from shoulder to shoulder; *outside*, attackable by all the thrusts made above the wrist on the outside of the sword; and the *low parts*, embracing from the armpits to the hips. For reaching and guarding these entrances, there are five positions of the wrist—prime, seconde, tierce, carte (quarte), and quinte. The most important, and those to commence with, are carte and tierce, from which are derived the subordinate positions of carte over the arm, low carte, and flanconade or octave.

To engage is to cross swords with your adversary, pressing against his with sufficient force to prevent any maneuver taking you unawares. To disengage is to slip the point of your sword briskly under his blade, and to raise it again on the other side, pressing in a direction opposite to that of the previous case.

The guard in each position is a passive obstruction to the opposing thrust; the parade is an active obstruction, in which the guard is first assumed, and the blade then pressed outward or inward by a turn of the wrist against the adversary's sword, so that when thrust at your body it shall be diverted from its aim, and held off. The parade may therefore be regarded as a mere extension of the guard. If the parade were called the "parry," it would convey its meaning more readily to English ears. Another, and perhaps more appropriate name for thrust, is the "lunge" or "longe," as the thrust is almost always accompanied by a lunge forward of the right foot, to give at once greater force and longer command to the blow.

The following are directions for the principal guards and thrusts.

Carte, Guard.—Turn wrist with nails upwards; hand on a line with lower part of breast; arm somewhat bent, and elbow inclined a little to the outside; point of foil elevated at an angle of about 15°, and directed at upper part of adversary's breast.

Thrust.—Being at the guard in carte, straighten the arm, raise the wrist above the head, drop the foil's point to a line with the adversary's breast, throw first the wrist, and then the whole body, forward by a lunge of the right foot of 2 ft. from the "guard," the left foot remaining firm. The left hand should be dropped during the lunge to a level with the thigh, and to a position distant about a foot from the body; it will then afford a good counterpoise to the sword-arm. During the whole action, the body must be perfectly upright. When performed briskly, it appears that the point and foot are advanced simultaneously, but in fact the point has, or should have, priority, in order that the instantly following lunge may drive it home. Most of these observations concerning thrust in *carte* apply equally to all other thrusts.

Carte over the arm is a variety of this thrust. The sword is driven outside the adversary's blade, from the carte position, but in the tierce line.

Low Carte.—Engage adversary's blade in carte, then drop point under his wrist, in a line to his elbow, and thrust at his flank, the body being considerably bent.

Flanconade or Octave.—Engage adversary's blade in carte, and bind it with yours, then carry your point behind his wrist and under his elbow: without quitting his blade, plunge your point to his flank.

Tierce, Guard.—As in carte, the nails and wrist being somewhat more downward, and the arm stretched a little outward, to cover the outside.

Parade.—Move arm, from the guard, obliquely downward to the right about 6 in., and oppose the inside of the adversary's blade.

Thrust.—From the guard, turn wrist with nails downward, the same height as in carte, the inside of the arm in a line with the right temple; then thrust and lunge as in carte.

Seconde, Parade.—Nails and wrist downward, hand opposed outward, and blade, pointing low, should form an angle of about 45° with the ground.

Thrust.—The same as tierce, but delivered under the adversary's wrist and elbow, to a point between his right armpit and right breast: the body to be more bent than in carte or tierce.

Prime, Parade.—In using prime to parry the thrust in seconde, pass your point over the adversary's blade, lower it to the waist, keeping your wrist as high as your mouth, nails downward, elbow bent, and body held back as far as possible. The left foot should also be drawn backward a few inches, to remove the body further from the hostile point.

Thrust.—An extension movement from the parade.

Quinte, Parade.—Wrist in high carte, sword-point low, and oppose adversary from the forte of the outside edge of your blade.

Thrust.—Make a feint on the half-circle parade, with the wrist in carte; disengage your point over the adversary's blade, and thrust directly at his flank.

Half-circle, Parade.—One of the principal defensive parades: straighten arm, keep wrist in line with shoulder, nails up: by quick motion of wrist sweep point from right to left in a circle covering your body from head to knee, until the adversary's blade is found and opposition established.

The parades parry thrusts as follows:

Carte, with wrist low, parries low carte and seconde; with wrist raised, all the thrusts over the point on the inside of the sword and the flannonnade.

Tierce parries high carte; with raised wrist, parries tierce.

Seconde parries all lower thrusts, both inside and outside.

Half-circle parries carte, high carte, tierce, and seconde.

Prime parries carte, low carte, and seconde.

Quinte parries seconde and flannonnade.

In all parades or parries, care must be taken that in covering the side attacked, the parade is not so wide as to expose the other side to the enemy. A steady countenance, showing no disquietude at any attempt he may make, is, above all, necessary in parades.

Every parade has its return, which should be made with vivacity and decision. A thrust can be returned when the adversary thrusts, or when, baffled in his attack, he is recovering to his guard. In the first case, no lunge is necessary, the return being made from the wrist: this return requires great skill and quickness, since the adversary should receive the thrust before, by finishing his own, he has touched your body.

Ordinary Returns.—After carte parry, return in carte; after tierce, return in tierce; after parrying high carte, return seconde; after parrying seconde, return in quinte; after parade in prime, return seconde or low carte.

Feints, of which there are many varieties, consist in threatening an attack on one side of the sword, and then executing it on the other. The best parade against a feint is that of the half-circle, which will be sure to find the adversary's point.

Advance and Retreat are motions of attack or withdrawal, performed by advancing the right, or withdrawing the left foot suddenly about 18 in., and instantly following it with the other foot. As the adversary advances, you must retreat, unless prepared to receive him at the sword-point.

Salute.—The salute is a courteous opening of the fencing, and consists in gracefully taking off the hat, while, with the foils, your adversary and yourself measure your respective distances.

Appels or beats with the right foot, *beats* on the adversary's blade, and *glissades* or glidings of one sword along the other, are motions intended to confuse the enemy, and give openings for thrusts.

Voltes, demi-voltes, and *disarming*, were maneuvers formerly taught with care, but they are now quite discarded in the academies of England and France, as useless and undesirable.

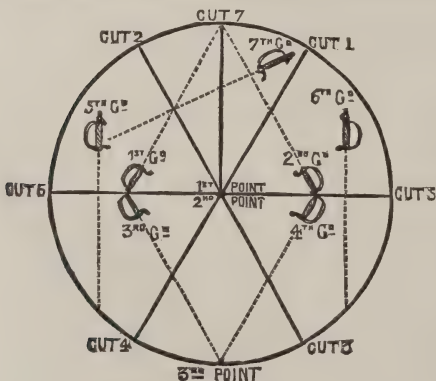
In Spain and Italy, considerable differences of practice from that in France and England prevail. The left hand is used as an auxiliary in parrying, and in Italy is aided by a dagger, or sometimes a cloak. The Spaniard, though trusting to his sword and left hand only, has his blade 5 ft. long, with sharp edges; his guard is nearly straight, and one of his favorite attacks is by a *cut* (not thrust) at the head.

In an article limited in length as this must necessarily be, it is impossible to give more than the merest outline of the various motions; but, of course, in actual practice,

there are endless variations of the different modes of attack and defense, which will be severally adopted according to the skill and option of the fencer. There is no finer indoor exercise than F., as the muscles in every limb are developed and strengthened by it. The great requirements for success are a steady eye and hand, a quick purpose as quickly executed, and perhaps, above all, perfect equanimity of temper.

THE SWORD EXERCISE differs from F. with the foil; in that, the weapon employed has one cutting edge as well as a point, and is therefore intended to cut and thrust. The sword is the arm of all officers in the army and navy, of many non-commissioned officers, and constitutes the sole mode of attack and defense for the officers of the British volunteers. A certain degree of proficiency in its use is therefore always service-

able. In practice, the usual substitute is a stout, straight stick, called a "single-stick," having a basket-handle to protect the knuckles.



The position of the combatant is the same as that assumed in F. with the foil; the lunge is similar, as are also the "advance" and "retreat," and other minor points. According to the instructions of drill masters, there are seven cuts, with seven corresponding guards, and three thrusts. The theoretical directions of all these are shown on the accompanying diagram, which represents a target placed opposite a pupil, so that he may see the motions he is expected to perform displayed before him. The center of the target is supposed to be in a line with the center of his breast.

The cuts proceed from the circumference towards the center along the *thick* lines. Nos. 1, 3, and 5 are inside cuts, and attack the left cheek, left side, and inside of the right leg respectively; 2, 4, and 6 are outside cuts, attacking the enemy's right cheek, right side, and right leg on the outside. No. 7 is a vertical cut, aimed at the head.

The dotted lines show the position of the sword in the several guards by which the cuts are opposed. The sword-handles illustrate the situation of the right hand with reference to the center of the body.

The points or thrusts are shown by the black circles. That towards No. 1 should be directed with the wrist and edge of the sword upwards to the right; towards 2, with the edge upwards to the left; and in the 3d point, with the wrist rising to the center, and the edge upwards to the right.

The "parry" is an additional defensive movement, and consists in bringing the wrist nearly to the right shoulder; whence, as center, a circular sweep of the sword is made from left to right.

A considerable latitude is allowable in regard to the cuts, as to the part of the adversary's body at which they are directed, provided the general inclination of the blow be observed; similarly, the cut may at times be parried by a guard other than that intended specially for it, according to the discretion of the fencer.

In engaging, or joining swords, with the enemy, press the blades but lightly together, so that the hand and wrist may be readily susceptible of any motion. In making the guards, care must always be taken to receive, if possible, the feeble of the enemy's blade on the forte of your own, so as to offer the greater opposition. It should also be borne in mind that, in all cuts at the leg, when at proper distance, the shifting of your own leg, and delivering a cut at the same moment, becomes the most effectual and advantageous defense, particularly if you happen to be taller than your adversary, as you will then probably be out of his reach, while he is within yours.

In contending with bayonet or pike, the most effectual guard is the 5th, which, if well timed, enables the swordsman to seize the musket or pike with his left hand, and then make the 6th cut at his opponent's neck. In an encounter with the rapier, the best cuts are Nos. 3 and 4, as they attack the enemy's arm, which must be advanced within reach before he can touch your body, and also constitute a defense against his thrust. If the enemy—no matter how armed—be on horseback, the dismounted swordsman (provided he have proper nerve and agility) has decidedly the advantage. Endeavor to place yourself on his left, where he has less power of defending himself or his horse, and cannot reach to so great a distance as on his right: an attack on the horse will probably render it ungovernable, and it becomes easy then to avoid the rider's blows, while he himself may be attacked with impunity in almost any direction.

BAYONET EXERCISE.—If the sword exercise be of use to volunteer officers, there are thirty times as many volunteers themselves to whom a proper command of the bayonet is indispensable. In close-quarter engagements, there is no weapon more formidable: from its length and weight, the thrust of the bayonet gives a terrible wound, and its force is such that there is great difficulty in parrying the attack. Like other small arms, it is most serviceable when handled on scientific principles; and the art of using it to advantage is so simple as to be very easily acquired, while the exercise, from the weight of the rifle, admirably aids in developing the muscles of all parts of the body.

Of course, the bayonet is always fixed at the end of the musket, when it becomes virtually a pike. The position of the feet in the bayonet exercise remains always the same relatively, and absolutely until advance or retreat be effected. The right foot is thrown back 24 in., and the weight of the body thrown upon it. The heels are kept in a line with each other, both knees bent and well apart; the right knee directly over the foot, the left easy and flexible, pointing to the front. In this position of the body, all the defensive motions of the bayonet are made. In "guard," the bayonet is brought nearly to a horizontal direction, level with the waist, and pointing towards the breast of an advancing enemy. Similarly, to "guard," the positions "low," "high," and "second point" are assumed. The butt of the rifle is always kept well to the right side, the hand behind the trigger-guard, and the whole body in attitude to offer great resistance. In "low," the barrel is turned downwards; but in all the other defensive motions it is held upwards. The position of the arms is in each case that which would naturally be taken in placing the bayonet and musket in the required direction.

The offensive position of the body is acquired by the extension of the right leg, and bending forward of the left without moving the feet. The butt of the rifle is at the same time pressed firmly to the shoulder. This position is called "point," and constitutes an extension of the weapon in a direction parallel with either of those previously taken. As there were four "guards," so there are four points. The barrel is in each case upward, and the motions for each are similar, except in pointing from "2d point,"

when the rifle, seized by the right hand round the small of the butt, is thrust straight up above the head to the full extent of the arm, the left hand falling along the thigh, and the legs being straightened so as to form an isosceles triangle.

"Shorten arms" is a useful motion, both as a defense and as a preparation for a strong attack. It consists in carrying the butt back to the full extent of the right arm, while the barrel (downwards) rests upon the thick part of the left arm. The body is thrown upon the right leg, and the left straightened.

In all the guards and points, and also "shorten arms," the bayonet may be turned directly to the front, to the right, or to the left, as circumstances may suggest. In contending with a swordsman, the action of changing from right to left, when at the "high" or "low," is sufficient defense against the ordinary cuts of the latter.

Among the treatises consulted for this article have been the works on F. by Angelo and Roland, as well as the shorter instructions issued by the military authorities.

FÉNELON, FRANCIS DE SALIGNAC DE LA MOTHE, was b. Aug. 6, 1651, in the château Fénelon, province of Perigord, now included in the department of the Dordogne, of a family which has given many celebrities both to the church and to the state in France. His education was conducted at home up to his 12th year, when he was transferred to Cahors, and afterwards to the Plessis college in Paris. At the close of a most blameless collegiate career, he selected the church as his profession, and entered, in his 20th year, the newly founded seminary of St. Sulpice, then under the direction of the celebrated abbé Tronson, where he received holy orders in 1675. Unlike but too many ecclesiastics of his own rank at that period, he gave his whole heart to his sacred calling. For some time after his ordination, he was employed in attendance at the hospitals, and in other parochial duties of the parish of St. Sulpice; and in the year 1678, he was named director of an institution recently founded for the reception of female converts to the Roman Catholic faith, in Paris. During his tenure of this office, he wrote his first work, *On the Education of Girls*, which is still a standard authority; and the gentleness, moderation, and charity with which he discharged his duties towards the young converts, led to his appointment as head of a mission, which, on the revocation of the edict of Nantes in 1685, was sent to preach among the Protestant population of Saintonge and Poitou. In 1688, he resumed his duties in the Maison des Nouvelles Converties, at Paris; and in the following year, he was named by Louis XIV. to the highly confidential post of preceptor of his grandson, the young duke of Burgundy. F.'s management of this most important and delicate trust showed how well he understood the true nature and objects of education. All his own instructions, and all the exercises enjoined upon his pupil, were so contrived, as, while they imparted the actual knowledge which it is the ordinary business of a master to communicate, at the same time served to prepare the mind and the heart of the pupil for what was to be the real business of his life, by impressing upon him a sense of the responsibility which awaited him, of the great principles of truth and justice upon which these responsibilities are founded, and of the hollowness and futility of all earthly glory, power, and happiness, which do not rest upon this foundation. To this wise design of the preceptor we are indebted for many works still popular in educational use; for the *Fables*; for the *Dialogues of the Dead*; for the *History of the Ancient Philosophers*; for the germ at least of the *Telemachus*; and for the *Life of Charlemagne*; the manuscript of which last work, unfortunately, was burned in the fire which destroyed the archiepiscopal palace of Cambrai in the year 1697. As an acknowledgment of these great merits, he was presented by the king, in 1694, to the abbey of St. Valery, and in the following year, to the archbishopric of Cambrai, which he accepted only on the express condition that for 9 months of each year he should be exempted from all duties as preceptor of the prince, and left at liberty to devote himself exclusively to the care of his diocese. It is to this period of F.'s life that the history of the unhappy controversy about quietism belongs. Without entering into the details of this singular revival of the ancient mysticism (see MYSTICISM), it will be enough to say that two separate schools of quietism are to be distinguished, the moral character, or at least the moral tendency, of which was exceedingly different. See QUIETISTS. In one of these, the common mystic principle of the absorption of the soul in the love and contemplation of God, led to the conclusion that the soul, in this state of absorption, became entirely passive; that it was thenceforth independent of the external world; that it suffered no contamination from the material actions of the outer man, and that no acts of virtue, not even of prayer, were any longer required. See MOLINOS. The other school, while it maintained the theory of passive contemplation and love, yet repudiated the dangerous and immoral consequences which were deduced therefrom. It was exclusively the latter and less objectionable form of quietism, the professors of which for a time claimed, although not the patronage, yet at least the indulgent consideration of Fénelon. He formed, in the year 1687, the acquaintance of the celebrated Madame Guyon, who may be regarded as the foundress of the French school of quietism. See GUYON. The extraordinary piety and exemplary life of this remarkable woman, and his own natural bias towards the tender and lofty spirituality which she professed, appear to have blinded F. to the true nature and to the practical consequences of the system which she followed. Fully convinced of the unfairness of much of the outcry which was raised against her, and which made her responsible for all the principles of

the grosser quietism of Molinos, his generous mind was perhaps attracted to her cause by the very injustice of her opponents. He advised her to submit her works to the judgment of Bossuet, who was then in the zenith of his fame, and with whom F. was in the most friendly relations. In the condemnation of the book of Madame Guyon by this prelate, F. acquiesced; but as she made a formal submission to the church, he refused to join in any condemnation of herself personally. Nevertheless, when a commission was appointed to examine the whole affair, F., although not a member, took a part in the proceedings; and he even suggested certain changes in their report, which he subscribed in common with the rest. To the articles prescribed for her signature by this commission, Madame Guyon readily subscribed; but it was further considered necessary not only to publish a condemnation of her several works, but also to prepare a special exposition of the true doctrine of the church on these questions. When the work of Bossuet on this subject was completed, he submitted it to F. for his approval. This F. not only refused to give, but even composed his own *Maxims of the Saints in the Interior Life*, in explanation and defense of certain at least of Madame Guyon's doctrines. He submitted his book to the archbishop of Paris, and introduced into it some modifications which were suggested by the diocesan censors, cheerfully agreeing to the stipulation of the archbishop, that it should be kept back from publication until the completion of the rival treatise of Bossuet, *On the States of Prayer*. An unfortunate violation of this engagement, committed without the knowledge, and in the absence of F., was the last of a long train of causes which led to the painful and disedifying rupture between these two great prelates. F.'s book was received with much clamor, that of Bossuet was universally approved; and in the controversy which ensued, all the weight of the displeasure of the court, which F. had provoked by the covert strictures upon the existing state of things, in which he was believed to have indulged in his works of fiction, was brought to bear against him. He was ordered to submit his book to the judgment of an ecclesiastical tribunal, of which Bossuet was a member. F. refused to accept Bossuet as judge, on the ground that he had already prejudged the cause; and in the end he appealed to the judgment of the Holy See. Unfortunately, even while the affair was pending at Rome, the controversy was still maintained in France. Bossuet published a succession of pamphlets. Several of the bishops who had espoused the side of Bossuet, issued pastorals in the same sense. F. defended himself vigorously against them all in several publications, explanatory as well of his principles as of the personal imputations in which some of his adversaries did not scruple to indulge. The last blow against the ancient friendship of the great rivals was struck by Bossuet in his celebrated *Relation sur le Quétisme*. F. was wounded to the heart. The copy of Bossuet's pamphlet which first came into his hands is still preserved in the British museum; and the margin is literally filled with remarks, annotations, replies, denials, and rejoinders, in the singularly delicate and beautiful handwriting of the indignant archbishop. The copy now in the British museum is most probably one which, as we learn from his correspondence, he sent to his agent at Rome, and on the margin of which he corrected, for the guidance of his friend, the many false and exaggerated charges of his great antagonist. The substance of these replies he gave to the public in a most masterly defense, written, printed, and published within little more than a fortnight from the appearance of Bossuet's *Relation*. From this point, the controversy assumed a more personal, and therefore a more acrimonious character; and it was maintained on both sides till the long delayed decision of the pope brought it to a close, Mar. 12, 1699, by a brief, in the usual form, condemning the *Maxims of the Saints*, and marking with especial censure 23 propositions extracted from it. The conduct of F. under this blow constitutes, in the eyes of his fellow-churchmen, one of his highest titles to glory. He not only accepted, without hesitation, the decision of Rome, but he took the very earliest occasion to publish from his own pulpit the brief of his condemnation; he issued a pastoral address to his flock, to apprise them of the judgment of Rome, and of his own cheerful acquiescence; and he presented to his cathedral a magnificent piece of church-plate, a gold ostensory, in which the angel of truth is represented trampling under foot many erroneous works, the most prominent of which bears the title of *Maxims of the Saints*! Bossuet is said to have been greatly touched by the conduct of his noble adversary, and to have earnestly desired a reconciliation. But the adverse influence of the king, Louis XIV., and of the court stood in the way. The jealousy with which the political principles of F. were already regarded was heightened about this time into open hostility by the appearance of his *Telemachus*, which was printed from a copy surreptitiously obtained by his servant, and which the king regarded as but a masked satire upon his own court: Sesostris being supposed to represent the Grand Monarque himself; Calypso, Madame de Montespan; Proteusilaus, Louvois; and Eucharis, Mademoiselle de Fontanges. Louis's anger knew no bounds. F. was strictly restrained within his diocese; measures were taken to give the condemnation of his book every character of publicity; and what wounded him most of all, all intercourse with him, whether personal or by letter, was forbidden to his old and much-loved pupil, the duke of Burgundy. From this date, F. lived exclusively for his flock. He founded at Cambray a seminary for his archdiocese, which he made his own especial charge. He was assiduous in preaching, and in the discharge of the other duties of his office; and the fame of his benevolence, charity, and enlightened liberality is attested

by the order given in the campaign of 1709 to spare the palace and the stores of the archbishop of Cambray. The only later controversy in which he appears is the revival of the Jansenistic dispute in the well-known form of "The Case of Conscience" (see JANSEN), in which F. engaged earnestly on the side of orthodoxy. Notwithstanding the prohibition of his grandfather, the young duke of Burgundy retained all his old affection for his preceptor; and the highest hopes were entertained as to the future career of the pupil of such a school. These hopes were unfortunately cut short by the premature death of the duke in 1712. F. survived him but a short time. He died Jan. 7, 1715.

The works of F. are very voluminous. The latest collected edition extends to twenty 8vo volumes, and embraces every variety of subjects—theology, philosophy, history, literature, ancient and modern, oratory, especially the eloquence of the pulpit, asceticism, and spirituality in all its branches. His correspondence is very extensive and most interesting. Of his early sermons (one of which was delivered in his 15th year), a volume was printed in 1744. Of his mature discourses, two only have reached us in a finished state. They are of the very highest order of sacred eloquence. Of the rest, we can only judge from the skeletons which it was his habit to prepare with great exactness, and of which very many have been preserved. His literary and historical works, many of which were composed for the instruction of his pupil, are filled with allusions and suggestions illustrative of the principles of government and of the relative duties of sovereigns and subjects, far in advance of the time in which he lived. His work on the *Temporal Power of the Mediæval Popes* presents that doctrine in a form which divests it of many of those characteristics which are most objectionable in the eyes of Protestants; and even his spiritual writings in general may be read, and indeed are not unfrequently read, not only without offense, but even with positive advantage, by Christians of all denominations. See card. Bausset's *Histoire de Fénelon* (3 vols., 1808-9); also the *Vie de Bossuet* of the same author. See also the life prefixed to the collected edition of the *Œuvres de Fénelon*; the voluminous correspondence contained in that collection; *Vie de Fénelon*, by M. Gosselin; Wunderlich's *F.* (1873); and Hunnius, *Das Leben F.'s* (1873).

FÉNELON, FRANÇOIS DE SALIGNAC DE LA MOTHE, 1641-79; half-brother of the great archbishop. He was a missionary in Canada, and founded, among the Cayuga Indians who had left New York and settled on the bay of Quinté, an establishment for the education and protection of Indian children. He had a disagreement with Frontenac, the governor of Canada, and was sent back to France.

FENESTELLA, or FENESTRELLA, a genus of polyzoa, resembling the recent "lace coral," very common in paleozoic rocks, from the lower Silurian to the Permian. Thirty species have been described.

FENIAN SOCIETY, a political association of Irish or Irish-Americans, the object of which is the overthrow of the English authority in Ireland, and the establishment of a republic. The etymology of the name has been the subject of some discussion. It is traced to the ancient Irish military organization called Fionna Eirinn, which took its appellation from the celebrated hero of Irish legend, Finn (or Fionn) MacCumhail. The accounts of this renowned body, with which the bardic literature of Ireland abounds, are most curious. It was designed as a national militia, and its origin is ascribed, by Keating, to Sedna II., who was monarch of Ireland about 400 years B.C. In time of peace it consisted of three bodies, each formed on the model of a Roman legion, and consisting of 3,000 men; but in war, it was capable of being enlarged to any required limit. Candidates for enrollment were required to be of an honorable family, to be irreproachable in morals, and to bind themselves to observe the laws of justice and morality; they were required to be of a certain height, and strong, supple, and vigorous of body; each being submitted, before enrollment, to an ordeal, in which his powers of speed, strength, endurance, and courage were tested by trial with his future comrades. The bardic accounts of some of those conditions are extravagant and amusing in the highest degree, but the generally historical character of the institution is unquestionable; and it subsisted until the reign of Carbry, son of Cormac MacArt, by whom the body of Fionna Eirinn was disbanded, and the members having, in consequence, transferred their allegiance to Mucorb, king of Munster, suffered an almost total extermination in the battle of Gavra, 284 A.D., which formed the theme of many a bardic poem from the days of Oisín (known in Gaelic legend as Ossian), son of Finn MacCumhail, downwards.

Adopting the name of this ancient military association, the modern Fenians (or Finians) are a secret association for the purpose of overthrowing the alien ascendancy of the Saxon, and of restoring to the ancient Celtic population their legitimate status and influence in their native country. It had its first seat in America, where the Irish population has largely increased since the famine of 1846-47. Many of the emigrants being driven from their homes by arbitrary ejectment, or from inability to pay rent, carried with them a sense of fancied wrong, which prepared them for almost any enterprise which seemed to promise revenge. Others had been sympathizers, if not participants in the insurrection of 1848; and almost all were deeply imbued with general political and social discontent. By all these, the prospect of a secret organization for

the establishment of Irish independence was eagerly accepted. The most openly active seat of the organization was in the western states, especially Chicago; but the movement was directed from New York, and possessed ramifications in almost every city of the union. It was conducted by a senate, and consisted of "circles," each directed by a center. The duty of the centers was to enroll members, who bound themselves, generally by oath, "to be faithful to the Irish republic as at present virtually established;" to instruct and practice them in military exercises; to raise funds for the purposes of the association, especially for the purchase of arms and munitions of war; and to extend the organization by every means at their disposal. Agents were sent into Ireland; and to the chief seats of the Irish population in England; and while the work of secret enrollment was industriously carried on in Ireland, measures were openly concerted in America, as well for the raising of funds by private contributions, as for the purchase of arms and military stores. Opportunely, too, for the purposes of the enterprise, the termination of the civil war in America set free a large number of military adventurers who had served as privates or as officers in one or other of the American armies, and whose experience of service was turned secretly but most actively to account in the training of the young recruits enrolled in the Fenian conspiracy in Ireland. Newspapers, moreover, both in America and in Ireland, were established or subsidized for the purposes of the conspiracy; and journals, broadsides, ballads, and other inflammatory publications were largely circulated among the peasantry and artisans. Taverns, alehouses, and other places of entertainment were the ordinary places of meeting; and one of the most formidable of the plans of the conspiracy was an organized attempt to seduce the Irish soldiers from their allegiance, and to prepare the way for their deserting to the ranks of Fenianism, when it should have reached the expected degree of maturity. It became apparent, moreover, that in this, unlike almost all similar movements, pains were taken by the organizers to exclude the Catholic clergy, by whom the Fenian confederation had from the first been steadily resisted, from all knowledge of its character and objects, as well as of the names or number of its members in the several localities; and many of the most active of the leaders were distinguished by the freedom of their religious opinions, and by their unconcealed disregard of clerical authority.

For a time, these designs were carefully concealed, and even when a certain publicity was given to them, the scheme appeared so wild and impracticable that it was regarded as an attempt, on the part of a body of unprincipled adventurers, to practice upon the patriotic susceptibilities of the ignorant and excitable Irish, especially in America. By degrees, however, the movement acquired more solidity, and the government ascertained by reliable information that Fenianism, however corrupt in some of its sources, and however wild and extravagant in its aims, was nevertheless a reality with which it had become necessary to grapple. Measures were taken with great promptness and determination. The habeas corpus act having been summarily suspended, all the known leaders in Dublin and in the provincial districts of Ireland (most of them Irish-Americans) were at once placed under arrest. The chief journal of the conspiracy was suppressed and seized; additional troops were moved into Ireland, and other measures of repression were vigorously carried out. By these energetic measures, public tranquillity was maintained in Ireland; and although prosecutions were instituted, and a few individual conspirators convicted, so universally was the movement condemned by the public opinion of the country, that most of the prisoners were discharged, on condition of their leaving Ireland. But although thus in appearance extinguished, the embers of discontent continued to smolder among the poorer peasantry and the working population of the towns; and a certain prestige was given to the fallen cause by the escape from prison, under circumstances of much mystery and a high degree of romance, of the most active and crafty of the leaders of the conspiracy. His return and that of other exiles to America renewed the agitation in that country. In the early summer of 1866, a raid was attempted into Canada, and although it proved so utter a failure as to cover its projectors with ridicule, an organization was secretly pursued, both in America and in Ireland, which resulted, in the spring of 1867, in an insane and utterly abortive attempt at insurrection at home. The plan of the conspirators was to seize the castle and military stores at Chester, and, having cut off telegraphic communication, to convey these arms to Dublin, and effect, throughout the country, a simultaneous rising in concert with the enterprise at Chester. The attempt was defeated through the treachery of one of the conspirators, by whom the plot was revealed. A partial insurrection, however, took place concurrently with the attack on Chester, in the county of Kerry; and a few weeks later, a more extensive movement was attempted in the counties of Dublin, Louth, Tipperary, Limerick, and Cork. But the persons engaged in it were for the most part either American and Irish-American adventurers, or artisans, day-laborers, and mechanics, generally unprovided with arms, and in many cases scarcely beyond the years of boyhood. The only military enterprises undertaken by them consisted in a series of attacks on the barracks of the rural constabulary, in almost every instance unsuccessful; most of the parties dispersed or were made prisoners after a single night's campaign. The rest betook themselves to the mountains, and after a few days of exposure and hardship, in which they managed to evade pursuit, and carefully avoided all encounter with the military, they were either captured or dispersed. The leaders were tried at a special commission held within the spring of the year 1867, and

tranquillity for a time seemed to be restored in Ireland. Much discontent, however, still continued to exist; and as the foreign organization was uncontrolled, and was still maintained, it remained as a standing element of danger, and a persisting incentive to domestic disaffection. Considerable alarm was created in England and Scotland by the extent and daring of the organization among the Irish population of the large manufacturing towns. In Sept., 1867, an attack was made, in open day, on a police-van in Manchester; the officer in charge was killed, and the prisoners, who were suspected Fenians, were released. A few weeks later, a still more daring attempt was made to blow down Clerkenwell prison wall, with the same object. Alarms were circulated of intended burnings in the cities and towns; gunsmiths' shops and even government stores of fire-arms were broken open and pillaged; and a vague but wide-spread feeling of apprehension was for a time created. In 1869 the Fenian brotherhood was formally chartered in the U. S.; in 1871 another Fenian raid in Canada was frustrated by the U. S. government. The disestablishment of the Irish church, 1869, and the land act of 1870, removed grievances. In Oct., 1879, the extreme section of the home rulers constituted the land league. The "Patriotic brotherhood" seems to have been one of several societies sprung from the Fenian society, and it is believed that many of the "Invincibles" who were concerned in the assassinations of the Irish secretary and others in 1881-2 were Fenians. The settlement of the Alabama claim is supposed to have taken out of the hands of the American Fenians one of the most powerful instruments of agitation among the Irish population in America. See HOME RULE: IRELAND—LAND LEAGUE.

FENN, GEORGE MANVILLE, author, born at Pimlico, England, in 1830, was by profession a school-teacher, but entered into the printing business, and in 1865 began to contribute short sketches to various magazines. In 1870 he became editor of *Cassell's Magazine*, and subsequently was for a time owner of *Once a Week*. Among the numerous works of this author are novels of considerable merit, boys' stories, and dramas, including *First in the Field* (1894), *Diamond Dyke* and *The Young Castellan* (1895), etc.

FENN, HARRY, b. Richmond, England, in 1838; removed to the U. S. when 18 years old; afterwards traveled extensively. He early attained a high position as a landscape illustrator of great versatility. The best work is rich in poetic quality, yet faithful to nature. He exhibits in water-colors and oils; illustrates for leading magazines, and is well-known for illustrations in *Picturesque America* and *Picturesque Europe*.

FENNEC, or **ZERDA**, *Megalotis*, a genus of *canidae*, peculiar to Africa, resembling foxes in general form and in the bushy tail, but having eyes adapted for diurnal and not for nocturnal vision, and remarkably large ears. The species are small and beautiful. They feed partly on dates and other vegetable food, also on eggs, and on insects, which they adroitly snap as they pass.

FENNEL, *Feniculum*, a genus of umbelliferous plants, allied to dill (q.v.), but distinguished by the cylindrical strongly ribbed fruit. The flowers are yellow. All the species are aromatic, and have much divided leaves with thread-like segments. The best known is the **COMMON F.** (*F. vulgare*), a native of the s. of Europe and of some parts of England. It is a biennial, 3 or 4 ft. high, and is cultivated in gardens, chiefly for the sake of its leaves, which are boiled, and served up with mackerel, with salmon, and occasionally with other kinds of fish, or are employed to form a sauce for them.—**SWEET F.**, **ITALIAN F.**, or **CRETAN F.** (*F. dulce*), is a plant of much humbler growth, and annual, much cultivated in the s. of Europe, but too tender for the climate of Britain. The young sprouts from the root are sweeter and less aromatic than those of common F., and when blanched, are a very agreeable salad and potherb. The fruit (seed) is longer and paler than that of common F., has a more agreeable odor and flavor, is the favorite aromatic condiment of the Italians, and is used in medicine as a carminative and aromatic stimulant. *Oil of F.*, an aromatic, stimulant, and carminative essential oil, is also made from it.—**CAPE F.** (*F. capense*), found in the interior of the cape of Good Hope, has a thick, aromatic, esculent root.—The **PANMUHOOREE** of India (*F. panmorium*) is a species of F. much cultivated in its native country for its sweet, warm, and aromatic fruit, which is much used as a carminative, and in curries.—The **GIANT F.** of the s. of Europe is a plant of a different genus (*ferula*), and abounds in a fetid juice. It is indeed closely allied to asafetida, but forms a favorite food of buffaloes in Apulia, where it particularly abounds.

FENRIR, in Norse mythology, the offspring of Loki (the evil genius) and Angurboda (anguish-boding), a giantess from Jötunheim. Loki had a legitimate wife, Signy; but with Angurboda he became the father of three monsters: 1. The wolf Fenrir; 2. the Midgard Serpent; 3. the Goddess of Death, whose name is Hell (the English word "hell" is of similar derivation). The wolf Fenrir was bred among the gods, but only Tyr had the courage to give him food. When the gods saw how much he increased daily, and remembered that the predictions were that he was destined to be their destruction, they endeavored to chain him. But he easily broke the first two chains. Then they made a third. It was composed of the sound of a cat's footsteps, a woman's beard, the roots of a mountain, a fish's breath, and a bird's spittle. Fenrir suspected some trick in this, and he said: "If ye bind me so fast that I cannot free myself again, I am well convinced that I shall wait long to be released by you. I am, therefore, not at all desirous to let the cord be fastened upon me. But rather than that ye shall accuse me of want of courage, let one of you place his hand in my mouth as a pledge that

there be no guile in the case." The gods hesitated, but finally Tyr put his hand in the wolf's mouth, and the wolf in his vain struggles to break the chain bit off the hand. Fenrir could not break the magic chain, and became a captive to the gods until Ragnarök—the end of time—comes. Fenrir will then break loose, his upper jaw will touch heaven, his nether jaw the earth; fire will blaze from his eyes and nostrils. In the tremendous tumult which precedes the general dissolution, the wolf will swallow Odin (father of gods), and so cause his death. But at the moment will come Vidar, the silent god, who wears a wonderful shoe made from shoe-parings since time began. With that shoe he will hold down Fenrir's lower jaw, and with his hands tear off the upper jaw, and thus will the monster wolf be slain.

FENTON, a village in Genesee co., Mich., on the Detroit, Grand Haven and Milwaukee railroad, 50 m. n.w. of Detroit. Water power is furnished by Shiawassee River, and there are a number of manufactories. There are a high school, private normal school and commercial college, library, electric lights, water works, and weekly newspapers. Pop. '90, 2182.

FENTON, ELIJAH, 1683-1730; an English poet, master of a free grammar school in Kent. He was tutor to the only son of the earl of Orrery, and on the poet Pope's recommendation gave private literary instructions to Mr. Craggs, secretary of state. He assisted Pope in translating *The Odyssey*. In 1717, Fenton published *Miscellaneous Poems*, and in 1723 appeared *Mariamne*, a tragedy. He superintended a new edition of Milton's poems, and one of those of Waller. The epitaph on his tomb was written by Pope.

FENTON, REUBEN EATON, b. in w. N. Y., 1819. He studied in the local academies, went into law, and was admitted to the bar, but soon afterwards became a merchant. He was representative in congress from 1857 to 1865. In 1864, he was elected governor of the state, and re-elected in 1866, serving in all four years. In 1869, he succeeded ex-gov. Morgan as U. S. senator, serving for six years, and in 1878 he was chairman of the U. S. commission at the international monetary Conference at Paris. He d. 1885.

FENTRESS, a co. in n. Tenn., on the Kentucky border, drained by the head waters of the Cumberland river; 510 sq. m.; pop. '90, 5226, incl. colored. The surface is rough, and for the greater part covered with timber. Corn, cattle, and hogs are the staple products. Bituminous coal is found. Co. seat, Jamestown.

FENUGREEK, *Trigonella*, a genus of plants of the natural order *papilionaceæ*, sub-order *leguminosæ*, allied to clover and melilot. The leaves have three obovate leaflets and scythe-shaped stipules. The flowers generally have the *keel* very small, so that the *wings* and *standard* present the appearance of a tripetalous corolla. The COMMON F. (*F. fenum Græcum*) is a native of the s. of Europe, and of some parts of Asia; it is much cultivated in India as a fodder-plant, and derives its name (*fenum Græcum*, Greek hay) from its use as fodder in Greece. Its pods are many-seeded, and cylindrical; its seeds have a strong peculiar smell, and an oily bitter taste.

FENWICK, GEORGE, d. 1657; an English emigrant who settled near Saybrook, Conn., in 1636. He was governor of the colony, with a short interval of absence in England, until Dec., 1644, when he sold his plantation to the Connecticut colony, and returned to England, where he became a col. in the parliamentary army, and was appointed one of the judges on the trial of Charles I., but did not act.

FENWICK, JOHN, 1618-83; an English Quaker, founder of a colony at Salem, in New Jersey, in 1675. His rights were contested by sir Edmund Andros, governor of New York; he transferred his claims to William Penn; and died in poverty.

FENYES, ELEK (Alexius), a Hungarian geographer and statistical author, was b. in 1807, at Csokaj, in the co. of Bihar. After the usual career of studies in philosophy and law, F. became barrister-at-law as early as 1829; but instead of frequenting the law-courts, he began traveling all over the country, with the purpose of making himself thoroughly acquainted with the state of the Hungarian kingdom, of which there had never before been an authentic survey. The first fruits of F.'s enterprise appeared in 1840, under the title, *Hungary and its Annexed Parts, Geographically and Statistically considered* (6 vols., Pesth). The great prize of 200 ducats was awarded to the author by the Hungarian academy. *The Statistics of Hungary*, in 3 vols., followed (1843); *General Atlas for Hungary* (1845); *Description of Hungary* (1847); *Geographical Dictionary of Hungary* (1851)—all of which were published at Pesth. The whole of F.'s works are written in the Magyar tongue, but several of them have been translated into German, and repeatedly published. Besides that these works are the first true expounders of the state of Hungary, it is also generally admitted that, as to their completeness, solidity, and exactness, they will bear a comparison with the best of kindred works in European literature. During the national government of Hungary (1848), F. was made the chief of the statistical section. After a respite of several years, from failing health, F. again busily engaged for a time in the periodical press as editor of an agricultural paper, but soon retired finally into private life. He d. 1876.

FEOFFMENT (*infeudare*), the oldest, and for a long period the only, method for the conveyance of land known in England. F. consisted in the formal conveyance of the land from the feoffor to the feoffee, the former stating distinctly the measure of the estate conferred, whether it was in fee, in tail, or for life. Where no mention of the

duration of the estate was made, the gift was presumed to be for life. This conveyance of the land, in order to be complete; required to be accompanied by delivery of *sasine* (q.v.). Livery of *sasine* was of two kinds—viz., by deed, and in law. In the former case, the parties being actually upon the land, the feoffor, by delivery of a twig or a turf, testified his conveyance of the land. In livery in law, the parties being in sight of the land, the feoffor referring to the land gave possession to the feoffee. This mode of F. was ineffectual unless the feoffee entered into possession during the life of the feoffor. Livery in deed might be effected by attorney; but livery in law only by the parties themselves. In the earliest times, these ceremonies completed the conveyance. But by degrees the practice of embodying the transaction in a deed was introduced. When a deed was used, it became customary, but not essential, to indorse on the deed the fact that livery of *sasine* had been made. By the statute of frauds (29 Car. II. c. 3), it was declared that no estate created by livery of *sasine*, unless accompanied by writing, signed by the party or his agent, should be of any effect, except as an estate at will; and by 8 and 9 Vict. c. 106, s. 3, a feoffment is void unless accompanied by deed. The law formerly gave so great an effect to a feoffment, that even when the party ostensibly making the conveyance was not lawfully seized in the estate, the feoffment was sustained. This was called a tortious conveyance; the party in whose favor it was made was said to have acquired an estate by wrong, the rightful owner was dispossessed, and was left to his right of entry (q.v.). But by the act last mentioned, this tortious effect of a feoffment was removed. It must be observed that the practice of feoffment above described, and which has existed in England from time immemorial, differed materially from the old form of investiture in use in strictly feudal times, and from that which still prevails in Scotland. In England, the transaction was simply a conveyance by the actual holder of the land to a new tenant, testified by certain ceremonies, but requiring no confirmation by a third party to complete it. But by feudal usages, every holder of land was the vassal of some superior lord, to whom he owed suit and service, and without whose consent he could not even part with his land; hence no conveyance was complete without the reception of a new tenant by the lord paramount as his vassal. In like manner, to this day, in Scotland, no transfer of heritage is complete without the formal confirmation of the superior; and although by recent legislation the old feudal usages, which for two centuries have existed as landmarks, telling us of a system now passed away, have been abolished, yet the fact of acceptance by the superior, and the performance of the pecuniary services attendant on that acceptance, are still preserved. See INFECTMENT, SASINE, FEUDAL SYSTEM.

Feoffment to Uses.—This was an application of the feudal form of *feoffment* in England in order to effect a conveyance in trust. The common law courts, adhering to feudal rules, refused to recognize any interest in the land but that of the person actually infeft; but where a F. was made to one man to the use of another, the equity courts gave effect to the transaction by compelling the party infeft to hold in trust for the third person, called the *cestui que use*, who was said to have an equitable estate, in contradistinction to the legal estate which remained in the feoffee to uses. By the statute of uses, it was enacted that in all such conveyances the actual legal estate should pass to the *cestui que use*. See USES.

FER DE LANCE, *Craspedocephalus lanceolatus*, a venomous serpent of South America and the West Indies. It is very prolific; grows to a length of 5 or 6 ft.; gives no warning of attack, and its bite is often fatal. Those who recover through the application of counter-irritants are usually affected for years with paralysis or diseases of the blood.

FÉRÆ (Lat. *ferus*, wild), in the Linnæan system of zoology, an order of *mammalia*, nearly corresponding to the *carnaria* (q.v.) of Cuvier.

FÉRÆ NATURE (Lat. of a wild nature). Those animals which flee the dominion of man, whether beast, bird, or fish, and retain their natural freedom, are thus characterized in the Roman law. According to that system, such animals became the property of any one who might catch them, irrespectively of the ownership of the soil on which they were taken, on the principle that "natural reason gives to the first occupant that which has no owner."—*Inst. ii. tit. i. s. 12*. But this regulation did not prevent the prohibition of trespass. "Of course, any one who enters the ground of another for the purpose of hunting or fowling, may be prohibited by the proprietor, if he perceives his intention of entering" (*Ib.*). This right on the part of the proprietor did not affect the property of the animal taken, though it gave him an action against the trespasser. If a wild animal escaped from its captor, his proprietorship instantly ceased, and the animal might again be appropriated by its captor. This occurred even though the animal was not out of sight, if it could not be pursued without great difficulty. Even a wounded animal was not the property of the sportsman till it was caught, though the point which is decided in this sense (*Inst. ii. tit. i. s. 13*) is said to have been one on which difference of opinion had prevailed. Except in so far as it is modified by the statutes, which will be explained under **GAME-LAWS**, these provisions form part of the common law both of England and Scotland. Animals which are said to be F. N., or of a wild and untamable disposition, any man may seize upon and keep for his own use or pleasure; but if they escape from his custody, though without his voluntary abandonment, it naturally

follows that they return to the common stock, and any man else has an equal right to seize and enjoy them afterwards (Stephen's *Blackstone*, i. 161). The law of Scotland followed the law of Rome so closely in this, as in other respects, that the passage from the *Institutes* of Justinian above referred to was translated into one of the oldest collections of Scottish laws—that, viz., contained in the Cromortie MS., the date of which may be assigned to the latter part of the 14th c., and which certainly is not later than the reign of Robert III. (Irvine's *Game-laws*, p. 20, and statutes published by the record commission, appendix v. p. 385); see also Stair, ii. 1, 5, and 33; and Ersk. ii. 1, 10. Under animals, F. N., the law of Rome included *bees*, unless included in a hive, or *sheep*, as it is still called in Scotland, or unless the proprietor be in pursuit of them, and has kept them in sight. See BEE.

FERDINAND, PRINCE OF BULGARIA, the youngest son of Prince Augustus of Saxe-Coburg and Princess Clémentine of Bourbon-Orléans, a daughter of Louis Philippe, was born in Vienna in 1861. While serving in the Austrian army, he was offered in 1886 the vacant throne of Bulgaria, and on the 14th of Aug., 1887, was crowned. Although highly acceptable to his subjects, he was not recognized by Turkey or the Great Powers till 1896, when the Sultan officially recognized him as the lawful ruler, and asked the Powers also to do so. Soon afterward the Czar received him, thus completing the reconciliation with Russia, after a period of exciting political movements.

FERDINAND I., emperor of Austria (1835–48), eldest son of Francis I. by his second marriage with Maria Theresa of the house of Naples, was b. at Vienna, 19th April, 1793. He was from the first of a weak constitution, and was unfortunate in those to whom his education was intrusted. Yet he showed on all occasions a goodness of heart, which was fostered by the example of his uncle, the archduke Charles, to whom he was much attached. While crown-prince, he traveled through his Italian provinces, Switzerland, and part of France, and took great interest in manufacturing industry. In 1835, he succeeded his father on the throne. It was expected from his character that he would inaugurate a more liberal policy than his predecessors had pursued, but the absolutist principles that seem destined to rule forever the Austrian cabinet, triumphed, and Metternich was allowed to carry on the government. It now became obvious that F. sadly lacked moral decision, and his "goodness" exhausted itself in numerous acts of clemency and benevolence. Nevertheless, during his reign, the industry of Austria made a great advance, and the great net-work of railroads and highways was begun. The insurrection in Galicia, 1846, led to the annexation of Cracow to Austria. No country was more affected by the European movement that began in the winter of 1847–48 than Austria, though the revolutionary storms that shook the empire cannot be attributed to any want of good-will to his people on the part of F., but only to a complete want of political wisdom. On the disturbances breaking out in Mar., he consented to the dismissal of Metternich, the appointment of a responsible ministry, and granted the outlines of a constitution. In May, he retired with his court to Innspruck, but was induced to return to the capital in Aug. At last, the Oct. insurrection in Vienna made him again leave the palace of Schönbrunn, and retire to Olmütz, where, on 2d Dec., 1848, he abdicated in favor of his nephew, Franz Joseph. He afterwards resided at Prague, where he died, June 29, 1875. He married, 27th Feb., 1831, Caroline, daughter of Victor Emmanuel I., king of Sardinia, but had no children.

FERDINAND I., 1379–1416, of Aragon and Sicily, surnamed **THE JUST**, was the younger son of John I. of Castile and Leonora of Aragon. On the death of his elder brother Henry III. in 1406, he refused the crown of Castile which the nobles had offered, but in accordance with his brother's will undertook the office of regent during the minority of his nephew John II. In this capacity he distinguished himself by his prudent administration of home affairs, and by his victories over the Moors by land and sea. He took the title *de Antequera* on the surrender of that fortress after a siege of five months, 1410. On the death of his maternal uncle, king Martin of Aragon and Sicily, his claims to the throne, though not derived through the usual laws of descent, were taken up and keenly pressed by a powerful party in the state. The question of the succession was ultimately referred to a committee of nine judges equally representing Catalonia, Valencia, and Aragon; and the result was his election by a majority in 1412. After he had defeated, at Balaguer, count Jayme of Urgel, the last and most formidable of his rivals, he was formally crowned at Saragossa in 1414. From the year 1378, Europe had been scandalized by the spectacle of the papal schism; and since 1410, three rival popes had been claiming the obedience of the faithful. At the council of Constance in 1414, Ferdinand of Aragon was a prominent supporter of the Spaniard, Benedict XIII. (Peter de Luna), who had been deposed at Pisa in 1408. The deposition of John XXIII., and the abdication of Gregory XII. in 1415, having opened the way for peace, Ferdinand consented to be present at the meeting of Sigismund with the ambassadors of France, Castile, and Navarre, in Perpignan; and after long temporizing he ultimately agreed, for the sake of the unity of the church, to withdraw his obedience from Luna. He died in the following year at Ygualada, and was succeeded by his son Alphonso V., the conqueror of Naples.

FERDINAND II., King of Aragon and Sicily. See **FERDINAND V.** (**THE CATHOLIC**) **OF CASTILE.**

FERDINAND I., Emperor of Germany, 1556-64, was b. in Spain, 1503. He was the son of Philip I., and brother of Charles V., whom he succeeded in the empire in 1556, having been previously elected king of Rome. F. had married, in 1521, Anna, daughter of Ladislaus VI., king of Bohemia and Hungary. When her brother Louis fell in 1526 in battle with the Turks, leaving no issue, the crown was claimed by F. in right of his wife. This involved him in a long and bloody struggle with a rival, John of Zapolya, who laid claim to Hungary, and who, as well as his son Sigismund, was supported by Soliman, sultan of the Turks. F. at last gained the upper hand, bought off the Turks by a yearly tribute, and finally secured Hungary and Bohemia to the house of Austria. When he was elected emperor, the concessions he had made to the Protestants caused the pope, Paul IV., to refuse to acknowledge him. That pope dying, his successor, Pius IV., was more complaisant; but the electors resolved that for the future the consent of the pope should not be asked; and this was carried out. F. made several attempts to reconcile the Protestants and Catholics, and urged, though fruitlessly, the reformation of abuses on the council of Trent. He died in 1564, leaving the reputation of a prudent and enlightened ruler, and was succeeded by his son, Maximilian II.

FERDINAND II., Emperor of Germany, 1619-37, was b. at Gratz, 9th July, 1578. He was grandson of Ferdinand I., his father being Charles, archduke of Styria, the younger brother of Maximilian. F.'s mother, Maria of Bavaria, early inspired him with hatred against the Protestants. He was educated by the Jesuits at Ingolstadt, along with Maximilian of Bavaria; and at Loretto he had taken a solemn oath, before the altar of the Mother of God, to reinstate Catholicism as the sole religion of his dominions, at any cost. As soon as he succeeded to the government of his own duchy of Styria, he set about putting down Protestantism by force. He attempted the same in Bohemia and Hungary, of which countries he had been elected king during the lifetime of Matthias Corvinus; but though at first unsuccessful, and even in danger of losing his dominions, he ultimately managed, with the aid of the Catholic league and of the elector George I. of Saxony, to subdue them. Bohemia lost all its privileges. By hanging, confiscation of property, and the banishment of innumerable families, the wretched land was reduced to obedience; and the introduction of the Jesuits, and rigorous persecution of Protestants, re-established Catholicism. Meanwhile, F. had been elected emperor of Germany (1619). The war, which properly ended with the subjugation of Bohemia, was at the same time transferred to the rest of Germany, and took the character of a religious war—the famous “thirty years’ war” (q.v.). The two imperial generals, Tilly and Wallenstein, were opposed by a confederacy of the Protestant states of Lower Saxony, with Christian IV. of Denmark at their head; but the confederates were defeated by Tilly at the battle of Lutter, in Brunswick, and forced to conclude peace (Lübeck, 1629). Confident in the ascendancy which he had acquired, F., in the same year, issued an edict of restitution for the whole of Germany, taking away from the Protestants nearly all the rights they had acquired by a century of struggles; and the troops of Wallenstein and of the league were immediately set to work to carry it out in several places. But further proceedings were soon arrested by the dismissal of Wallenstein, on which the diet of the empire at Regensburg had insisted; and by the opposition of Richelieu, who put every wheel in movement to curb the power of the house of Austria. At this time also a formidable opponent to the schemes of the emperor appeared in the person of Gustavus Adolphus of Sweden (q.v.). After the murder of Wallenstein, the connivance at which is an ineffaceable blot on F.’s memory, the imperial commander, Gallas, gained, 1634, the battle of Nordlingen, which had the effect of detaching Saxony from the Swedish alliance; but the ability of the Swedish generals, for whom Austria had none that were a match, and the open part that France now took in the contest, brought back the balance of victory so far to the Protestant arms, that when F. died, Feb. 15, 1637, he had given up the hope of ever attaining his objects. His reign is one of the most disastrous in history; for Germany owes him nothing but bloodshed, and misery, and desolation.

FERDINAND III., Emperor of Germany, 1637-57, the son of Ferdinand II., was b. 11th July, 1608. He was not so much under Jesuitical and Spanish influence as his father. Having accompanied the armies in their campaigns after the death of Wallenstein, he had witnessed the miseries of war, and was inclined for peace; but the conflicting interests of the individual belligerents hindered any unity of view, and made it necessary to proceed with the contest. Thus was this miserable war protracted, ever extending in circuit and increasing in devastation owing to the growing licentiousness of the soldiery. At last, in 1643, a congress met at Münster to arrange terms of peace, which was concluded in 1648, and is known as the peace of Westphalia. At the diet of the empire, 1653-54, the last presided over by an emperor in person, F. effected important alterations in the administration of justice. He died, 2d April, 1657, shortly after concluding an alliance with Poland against Sweden. His son Leopold I., succeeded him in the German empire.

FERDINAND I., 1423-94; King of Naples; illegitimate son of Alphonso V. of Aragon and I. of Naples. He succeeded his father on the throne of Naples in 1458, but the pope favored John of Anjou. The latter invaded the kingdom and defeated Ferdinand, who fled to his capital. But the succeeding pope favored him,

and with the assistance of Scanderbeg, the famous Albanian chief, John was defeated with great loss, Aug. 18, 1462. In 1480, the Turks captured Otranto and murdered most of the inhabitants, but in the next year they were driven out and the place recaptured. In 1485, a number of nobles revolted. Ferdinand promised a general amnesty if they would make submission, and then treacherously murdered them. He died just as Charles VIII. of France was about to invade his dominions. His reign favored the advance of his people in knowledge and prosperity.

FERDINAND II., King of Naples, 1468-96; grandson of Ferdinand I., and son of Alphonso II., who abdicated the throne of Naples in the son's favor in 1495. The kingdom was invaded by Charles VIII. of France, and Ferdinand fled. When the French left Naples he was recalled, and, with the aid of Gonsalvo de Cordova, the great general of Ferdinand V. of Spain, he drove out the French invaders a short time before his death.

FERDINAND III., King of Naples. See **FERDINAND V.** (THE CATHOLIC) OF CASTILE.

FERDINAND I., 1345-83; King of Portugal, styled *EL GENTIL* (the Gentleman); son of Pedro I. (not Pedro the Cruel). He succeeded his father in 1367. On the death of Pedro of Castile in 1369, Ferdinand, as great-grandson of Sancho IV. by the female line, claimed the vacant throne, against the kings of Aragon and Navarre, and afterwards against the duke of Lancaster (married in 1370 to Constance, the eldest daughter of Pedro). Meanwhile, the crown had been actually assumed by Henry of Trastamara, the brother (illegitimate) and conqueror of Pedro. After one or two indecisive campaigns, all parties were ready to accept the mediation of Pope Gregory XI. The conditions of the treaty, ratified in 1371, included a marriage between Ferdinand and Leonora of Castile. But, before the union could take place, the former had suddenly become passionately attached to Leonora Tellez, the wife of one of his own courtiers, and having procured a dissolution of her former marriage, he lost no time in making her his queen. This strange conduct, although it raised a serious insurrection in Portugal, did not at once result in a war with Henry; but the outward concord was soon disturbed by the intrigues of the duke of Lancaster, who prevailed on Ferdinand to enter into a secret treaty for the expulsion of Henry from his throne. The war which followed was unsuccessful; and peace was made in 1373. On the death of Henry in 1379, the duke of Lancaster once more put forward his claims, and again found an ally in Portugal; but, according to the continental annalists, the English proved as offensive to their companions in arms as to their enemies in the field; and Ferdinand made a peace for himself at Badajoz in 1382, it being stipulated that Beatrix, the heiress of Ferdinand, should marry king John of Castile, and thus secure the ultimate union of the crowns. On the death of Ferdinand at Lisbon in the following year, leaving no male issue, the direct Burgundian line, which had been in possession of the throne since the days of count Henry (about 1112), became extinct. The stipulations of the treaty of Badajoz were set aside, and John, grand-master of the order of Aviz, Ferdinand's illegitimate brother, was proclaimed. This led to a war which lasted for several years.

FERDINAND (AUGUSTUS FRANCIS ANTHONY), b. 1816; titular king of Portugal, duke of Saxony, field marshal-general; married, 1836, to Donna Maria II. da-Gloria-Jeanne-Charlotte - Léopoldine - de-Cruz - Françoise -Xaviere-de-Paule - Isidore-Michaëla-Gabrielle-Raphaëla-Louise-Gonzague, queen of Portugal. He received the title in 1837, and after the death of the queen he acted as regent till 1855, during the minority of his son. In 1870, Prim and Serrano offered Ferdinand the crown of Spain, but he declined it. In 1869, he married Eliza Hensler, of Boston, Mass., a lady of rare beauty, who had been celebrated in America and Europe as a vocalist, and gave her the title of countess of Edla. He was somewhat celebrated as a painter and engraver. He d. in 1885.

FERDINAND I., king of the Two Sicilies, was the son of Charles III., of Spain, and b. 12th Jan., 1751. When Charles ascended the Spanish throne in 1759, F., though a minor, succeeded him on that of Naples under a regency. After his marriage, in 1768, with Maria Carolina, daughter of the empress Maria Theresa, he fell completely under her influence, and lost all his former popularity. The queen and her favorite minister, Acton (q.v.), ruled the kingdom. F. joined England and Austria against France in 1793, but in 1801 was forced to enter into a treaty with the first consul. A subsequent violation of this treaty compelled him, in 1806, to take refuge in Sicily, under the protection of the English. A French army marched into Naples, and took possession of the kingdom, which Napoleon bestowed first on his brother Joseph, and afterwards on Murat. F. was reinstated by the congress of Vienna, and entered Naples, after Murat's flight, in June, 1815. His queen had died in 1814. During the revolution of 1820, he was obliged to introduce the Spanish constitution of 1812, but abolished it next year, with the help of Austrian arms. He, however, expelled the Jesuits, and abolished superfluous convents; acts that may, perhaps, partly atone for his bloody persecution of the republicans in 1800, and his general antipathy to enlightened principles of government. He died Jan. 4, 1825, and was succeeded by his son Francis I., who died in 1830.

FERDINAND II., king of the Two Sicilies, was the son of Francis I., by his second wife, Isabella Maria, of Spain, and was b. 12th Jan., 1810. He succeeded his father in 1830. The country was in the most wretched condition; and all eyes were turned to the young king, the beginning of whose reign was marked by various acts of clemency towards political enemies, and also by the introduction of reforms in the economy and government of the country. But it was not long before he began to listen to foreign counsels, which saw danger for the whole peninsula in liberal measures. From that time, Naples became the scene of incessant conspiracy, insurrection, bloodshed, and political prosecutions. F. yielded to the storm of 1848, and granted a constitution to both parts of his dominions; he was even obliged to take part in the war against Austria, in Northern Italy. The Sicilians mistrusted, and with reason, the king's proceedings, and declared that he and his family had forfeited the Sicilian crown. F. followed the constitution so far as to call the chambers together, but quickly dismissed them, impatient of any interference with his authority. After the subjugation of Sicily, in 1849, when the reaction began to set in all over Italy, he hastened completely to set aside the new constitution; while all who had taken any part in state reforms were subjected to those cruel persecutions that the letters of Mr. Gladstone have held up to the execration of the world. F. died 22d May, 1859, and was succeeded by his son Francis II.

FERDINAND I., 1000-1065; surnamed **THE GREAT**, first sovereign of independent Castile, was the second son of Sancho III., of Navarre, who, about 1026, compelled Bermudo III., of Leon, the last direct descendant of Pelayo in the male line, to surrender his rights over Castile, and also to give his sister Sancha in marriage to Ferdinand, then regent of that province. Sancho, towards the close of his energetic life, divided his extensive domains among his four sons, Castile being the portion allotted to the second. Bermudo of Leon, shortly after Sancho's death, sought to recover his lost possessions, but was defeated and slain. Ferdinand, now king of Leon as well as Castile, by a conciliatory yet firm policy, soon established his authority over his conquered subjects; and when, in 1053, his dominions were invaded by his brother Garcia III. of Navarre, the attack resulted in the death of the latter on the battlefield of Atapuerca, near Burgos, and the annexation of a large portion of his dominions. At an early period of his reign Ferdinand began to direct his arms against the Moors; and by a series of successful campaigns he extended the Christian frontier from the Douro to the Mondego, and reduced to vassalage the emirs of Toledo, Saragossa, and Seville. Even the Arab chronicles mention his victories from Badajoz, in Estremadura, to Albarracin in Aragon. He had set out on an expedition against Valencia, when he was seized with a mortal illness, which compelled him to retire to his capital, where, after having divided his dominions among his three sons, he died. Ferdinand appears to have laid claim to the title of "emperor" of Spain; and Mariana alleges that at a council held at Florence in 1055, the emperor Henry III., lodged a formal complaint against this infringement of his rights of suzerainty; that this complaint was sustained by Pope Victor II., but that at a conference afterwards held at Toulouse a decision favorable to Ferdinand's imperial rights, so far as they related to the territories which had been conquered from the Moors, was given, chiefly in consequence of the representations made by the famous Cid, Ruy Diaz de Bivar. Though this statement can be received not without reserve, it is certain that both in virtue of the ascendancy he won for himself in Christian Spain, and also in virtue of his notable successes over the Moors, Ferdinand I. is fully entitled to the rank which tradition has assigned him among the greater Spanish sovereigns.

FERDINAND II., 1136-88; younger son of Alphonso VIII., became king of Leon on the death of his father in 1157. A dispute that arose between him and some of his powerful nobles gave his brother Sancho III. of Castile a pretext for invading his territory, but the timely submission of Ferdinand averted serious disaster. The death of Sancho shortly afterwards led to a military occupation of Castile by Ferdinand, professedly in the interests of his nephew Alphonso III.; and this occupation lasted till the marriage of Alphonso to Leonora, daughter of Henry II. of England, in 1170. Meanwhile Ferdinand, having repudiated his wife, Dona Urraca, had become involved in a war with his father-in-law, Alphonso I. of Portugal, which resulted in the defeat and capture of the latter at Badajoz in 1169. The later years of the reign of Ferdinand II. were distinguished by sundry successes over the Moors, especially by a brilliant victory at Santarem; and also by the incorporation of the great military order of Alcantara, which received its first regular charter from Pope Alexander III. in 1177. He died at Benavente, Leon, in 1188, and was succeeded by his son Alphonso IX.

FERDINAND III., 1200-52, King of Castile and Leon, usually known as **SAINT FERDINAND**, was the son of Alphonso IX. of Leon, and of Berenguela, sister of Henry I. of Castile. On the death of Henry, without issue, in 1217, the just title of Blanche, the elder of the surviving sisters, was set aside, and Berenguela procured the proclamation of Ferdinand. He rapidly secured the homage of the towns and submission of the nobles, especially of the brothers Alvaro and Ferdinando de Lara. On the death of his father in 1230, he ultimately, though not without dispute, became king of Leon as well as Castile, thus finally uniting the two kingdoms under one crown. Following up the

advantage which had been gained for the Christian arms by his father and the allied kings in the great battle at Las Navas de Tolosa in 1212, he devoted all his energies to the prosecution of the Moorish war. Among his conquests may be mentioned those of Ubeda in 1234, of Cordova in 1236, of Jaen in 1245, and of Seville in 1248. He was planning an invasion of Africa, when he died at Seville, leaving his kingdom to his eldest son Alphonso X. Though not canonized till centuries afterwards (by Clement X. in 1671), he came to be popularly known as *el Santo* from a very early period. Distinguished though he was for great military talent, he was still more remarkable for his religious zeal. Like his younger cousin Saint Louis of France, he was supremely a champion of the Roman Catholic faith. It was not on the field of battle alone that his ardor was displayed. None of his Spanish panegyrists fail to relate how it was his wont to assist in carrying wood for burning the followers of the Albigensian heresy, and how sometimes with his own royal hands he applied the torch to the pile. While as a crusader he is hardly eclipsed by Louis, he contrasts very favorably with him as a sincere friend of learning. He was the original founder of the university of Salamanca, which his son and successor did so much to foster and encourage. He it was, also, who caused to be translated into the vulgar tongue the *Fuero Juzgo* or code of Visigothic laws, which, as collected and translated at his instance, has the double interest of being one of the oldest extant specimens of Castilian prose, and also of being the foundation of Las Siete Partidas, the code of Christian Spain, which was finally drawn up by Alphonso the wise.

FERDINAND IV., 1285-1312 ; King of Castile and Leon, succeeded his father, Sancho IV., in 1295. The years of his minority were disturbed by a series of civil wars caused by the pretensions of his cousins Don Juan and Don Alonso de la Cerda to the crown, by the disputes of Haros, Laras, and other nobles about their privileges, by the restlessness of the municipalities, and by the ambition of the neighboring kings of Portugal, Aragon, and Granada. The queen-mother, Maria de Molina, on each new outbreak succeeded in procuring peace by diplomatic tact and judicious compromise. Secure at last in possession of his throne, Ferdinand was free to pursue the traditional policy of war against the Moors; and in carrying it out he was aided by pecuniary grants from his own nobles and from the pope (Clement V.), as well as by the spoils of the templars on the extinction of that order in 1310. His chief exploit, as recorded by the historians, both Spanish and Arab, was the expedition against Algeciras in 1309, which, while unsuccessful in its main object, resulted in the surrender of Gibraltar and the cession of other strongholds. In the course of a subsequent campaign he died suddenly at Jaen. According to Mariana, he had on the 8th of Aug. preceding condemned to death without lawful trial two brothers of the name of Carvajal. These protesting their innocence, had summoned him to meet them within thirty days at the bar of God; hence his surname, *el Emplazado*, "the Summoned." He was succeeded by his infant son, Alphonso XI.

FERDINAND THE CATHOLIC, 5th of Castile, 2d of Aragon, 3d of Naples, and 2d of Sicily, was b. 10th Mar., 1452. He was the son of John II., king of Navarre and Aragon; and in 1469 married, at Valladolid, Isabella, sister of Henry IV. of Castile. Even in the lifetime of his father, events were paving the way for the subsequent union of the two kingdoms of Castile and Aragon. On the death of Henry IV. of Castile in 1474, the cortes refused to acknowledge the legitimacy of his daughter Juana, and proclaimed Isabella and her husband F. joint-sovereigns. A war ensued, in which they were completely successful. In 1479, F. becoming king of Aragon on the death of his father, the two kingdoms of Aragon and Castile were united in the persons of F. and Isabella. Isabella, however, as long as she lived, maintained her position as queen of Castile, and allowed her husband no other share in the government than the privilege of affixing his signature to the decrees, and of uniting his arms with her own. F.'s whole reign was an uninterrupted series of successful wars. In Castile, he distinguished himself by the effectual suppression of the banditti, who had become formidable in the confusion resulting from the civil wars. This he accomplished by reorganizing and putting in force against them the *hermandad*, or brotherhood, a kind of Spanish militia, composed of the citizens and the country-people. But F., whose craft and vigor were quite Machiavelian, was not content with taking strong measures against the Castilian outlaws; he also resolved to break the power of the feudal nobility, and make good use of the *hermandad* in carrying out this design. Cities and towns were encouraged to make themselves independent of the nobles, who were deprived of many important privileges. Among other humiliations, they were subjected to the ordinary tribunals of justice. The establishment of the inquisition in 1478-80, although primarily and mainly intended to further "religious" ends, likewise helped to lessen their influence. F. also strengthened his power by vesting in himself and his successors the grand-mastership of the military orders of Calatrava, Alcantara, and Santiago. In all his schemes, F. was ably seconded by his queen Isabella, and by the celebrated cardinal Ximenes. The year 1492 was the most brilliant in his reign, and is one of the most important in the history of the material progress of the world. It was signalized by the discovery of America by Christopher Columbus, though the honor of having aided the great navigator belongs not to F., but to Isabella. The same year witnessed the

capture of Granada, and the retreat of the last Moorish monarch into Africa. F., who had a true Spanish hatred of heresy, immediately issued an order for the expulsion of the Jews from the conquered kingdom; and, in consequence, 160,000—some say 800,000—of his new subjects were compelled to scatter themselves over Europe. This act was neither wise nor Christian, but it was in accordance with the religious barbarism of the age, and especially of Spain. It was followed, several years after, by the persecution and expulsion of the Moors—an act still more unwise than the former, for the Moors of Granada were unquestionably the most industrious, civilized, and refined inhabitants of the peninsula. F. was as successful abroad as at home. He was victorious over Alfonso V., king of Portugal; while his general, Gonzalvo de Cordova, twice wrested Naples from the French—the second time in 1503—after which it remained permanently in F.'s possession. In the following year, Isabella died; and in 1505, he married Germaine de Foix, a niece of Louis XII. of France. He took part in the famous league of Cambrai formed against Venice in 1508; made himself master of various towns and fortresses in Africa; and in 1512, conquered the kingdom of Navarre; thus becoming monarch of Spain from the Pyrenees to the rock of Gibraltar. He died at Madrigalejo, Jan. 23, 1516; and was succeeded by his grandson, Charles V. To F. and Isabella, Spain owes her unity and greatness as a nation; and, in the no less skillful hands of their successor, she exercised an imperial influence over Europe, which it required Luther and the reformation to check. See Prescott's *History of the Reign of Ferdinand and Isabella of Spain* (1838).

FERDINAND VI. 1713-59; King of Spain, sometimes called THE SAGE, the younger son of Philip V. and Maria Louisa of Savoy. On the death of his elder brother, Louis, in 1725, Ferdinand was proclaimed prince of the Asturias; and in 1729 he was betrothed to Barbara, daughter of John V. of Portugal. He succeeded his father on July 9, 1746. Since 1739, Spain had been involved in protracted war, first with England in consequence of disputes relative to British interests in the West Indies, and afterwards, since 1740, with Austria on the accession of Maria Theresa. It was Ferdinand's first endeavor on coming to the throne to secure peace for his exhausted country, and one of the earliest acts of his government was to order the withdrawal of the Spanish troops from Italy. Soon afterwards negotiations were opened for peace with England; and these, though frequently interrupted, ultimately resulted in the treaty of Aix-la-Chapelle, which terminated the war of the Austrian succession, thus restoring peace to Europe, Oct., 1748. Weak in health and despondent in temperament, Ferdinand had no inclination thenceforward to take an active part in European affairs, and the management of the public business he abandoned almost entirely to his ministers Ensenada, Carvajal, and Wall. These, however, always found it necessary to take into their counsel the queen, to whom Ferdinand was much attached, the royal confessor Rabago, and the singer Farinelli, whose musical powers had given him extraordinary influence. During this reign the condition of Spanish finance was much improved; agriculture, commerce, and the arts were encouraged; by a concordat with Pope Benedict XIV. in 1753, many abuses of ecclesiastical patronage were reformed; and the affairs of the army and navy were not neglected. On the outbreak of the seven years' war in 1756, Spain steadfastly maintained a strict neutrality, notwithstanding the repeated efforts of both France and England to secure her intervention, the former offering Minorca and the latter Gibraltar as the price of her assistance. On the death of his consort in 1758, Ferdinand fell into a profound melancholy, which issued in a confirmed insanity, under which he died at Villaviciosa. Leaving no issue, he was succeeded, according to the terms of the treaty of Aix-la-Chapelle, by his half-brother, Charles III.

FERDINAND VII. King of Spain, b. 14th Oct., 1784, was the son of king Charles IV. and the princess Maria Louisa of Parma. Although he had the advantage of excellent preceptors, especially the canon Escoiquiz, in his youth, yet the machinations of the notorious Godoy, minister of Spain, prevented him from enjoying any opportunities for the intelligent exercise of his faculties. A deliberate attempt was made by his mother and Godoy to degrade him into a lover of mere animal pleasures, that their influence and authority might be unrestrained. F. soon conceived an aversion to the minister, which was increased by his marriage in 1802 with the amiable and accomplished Maria Antonietta Theresa, daughter of Ferdinand I., king of the Two Sicilies. This lady, who endeavored to maintain her husband's dignity, died 21st May, 1806, of grief, as is supposed, at the insults offered to her by Godoy, the king himself, and above all by the queen. Suspicions of foul play, however, were entertained by Ferdinand. Mainly for the purpose of gratifying their hatred towards Godoy, a number of the nobles, headed by the duke of Infantado, assembled round the crown-prince. A false step that the latter now took proved the beginning of great misery to Spain. By the advice of the canon Escoiquiz, he wrote a letter to Napoleon, in which he expressed a wish to marry the eldest daughter of Lucien Bonaparte. This letter fell into the hands of the minister himself, and the prince was in consequence arrested in the Escorial, 28th Oct., 1807, and declared a traitor by a royal proclamation, written in Godoy's own hand, and addressed to the council of Castile. The animosity of the people towards the minister led to the revolution of Aranjuez, and the king abdicated in favor of F., 19th Mar., 1808. Almost immediately after, however, Charles wrote to Napoleon, declaring his abdication to be

forced. Napoleon, who had designs of his own upon Spain, refused to recognize F. as king, but sent him an invitation to meet him at Bayonne. In spite of all warnings to the contrary, F. repaired to Bayonne, at which place he arrived on the 20th April, and was received with distinction by Napoleon. Meanwhile, however, the French troops under Murat had marched across the Pyrenees, and taken possession of the Spanish capital. The wretched squabbles and recriminations that now took place between Charles and his son, and which were encouraged by Napoleon, ended in F.'s renouncing the crown of Spain unconditionally, receiving for himself and his posterity an annual income of 600,000 francs from the crown revenues of France, and likewise the palace and parks of Navarre. The château of Valençay, belonging to prince Talleyrand, was assigned to him as a residence, along with his brother Don Carlos, his uncle Don Antonio, the canon Escoiquiz, and the duke of San Carlos. Here his proceedings were watched with the utmost vigilance; and it was not till the end of the year 1813, when the splendid series of British triumphs in the peninsula had made a longer occupation of the country by the French impossible, that Napoleon offered to reinstate him on the throne of Spain. On the 14th of Mar., F. returned to Spain, where he was received with every demonstration of loyalty and affection. Very unfortunately for Spain, and also for his own comfort, F. had, in the mean time, learned to associate liberalism with Jacobinism, and both with Bonapartism, so that, on his reaccession to power, he threw himself into the hands of the clergy and the reactionary portion of his nobility. Even before his arrival in Madrid, he refused to swear or accede to the constitution of the cortes, as interfering too much with the free exercise of regal authority, though he promised another in its place. From the moment, however, that he assumed the reins of government, a series of transactions took place which excited the astonishment and disgust of all liberal-minded politicians in Europe. Instead of the promised constitution, there commenced a fearful system of persecution against all who were suspected of holding liberal opinions; and executions, imprisonment, exile, and confiscation of property reigned in all parts of the kingdom. The monastic orders, the inquisition, and the rack were restored, and every expression of opinion rigorously repressed. At length, in Jan., 1820, an insurrection broke out, and F. was compelled to restore the constitution of the cortes of 1812; but the French government interfering by force of arms, absolutism was restored in Spain in 1823. In 1829, F. married the notorious Maria Christina. She was his *fourth* spouse. By the first three, he had no children. Maria, however, bore him two children: Isabella II., the late queen of Spain, and the infanta Maria Louis, who married the duke of Montpensier. By the influence of Maria Christina, F. was induced to abrogate the Salique law excluding females from the throne, and to restore the old Castilian law of cognate succession. This step led to a dangerous combination among the adherents of the king's brother, Don Carlos, even during the lifetime of the former, and after his death, to a civil war. See CARLOS DE BOURBON; ESPARTERO. On the 20th June, 1833, the deputies, cortes, and grandees of the kingdom took the oath of fealty, and did homage to the princess of the Asturias, and F. died on the 29th Sept. of the same year.

FERDINAND III., grand duke of Tuscany, and archduke of Austria, was b. at Florence, 6th May, 1769. In 1790, he succeeded his father, Leopold II., in the government of Tuscany, when the latter obtained the imperial throne at the death of the emperor Joseph II., Leopold's brother. F.'s rule in Tuscany was one of combined mildness and ability; and during his reign were inaugurated many judicial, economical, and legislative reforms: commerce was protected and encouraged; hospitals and asylums founded, good roads opened through the state, and the greatest attention bestowed on the welfare of his subjects, which an enlightened and good prince could exercise. A lover of peaceful progress, he remained strictly neutral in the first coalition against France, and was the first sovereign in Europe to recognize and treat diplomatically with the French republic in 1792. In 1793, intimidated by the combined menaces of the Russian and British cabinets, F. was constrained to relinquish his neutral policy, and become a passive member of the coalition formed by the above governments against France. In 1795, on the French occupation of Piedmont, he speedily reassumed friendly relations with France. In 1797, in order to save his states from annexation to the Cisalpine republic, F. concluded a treaty with Bonaparte on most unfavorable terms; undertaking to pay a war-levy to France, and to transfer to the museum of Paris some of the chief master-pieces of the Florentine galleries, including the "Venus de' Medici." Owing to the continued intrigues of France in his states, F. was forced to seek an Austrian alliance, which furnished Bonaparte with a pretext for declaring war simultaneously against Austria and Tuscany. In 1799, F. retired to Vienna, leaving the French troops in occupation of Tuscany. In 1801, at the peace of Lunéville, he was forced to renounce all claim on Tuscany. In 1814, the peace of Paris reinstated him in Tuscany, and even restored his artistic treasures. He died 17th June, 1824, leaving his states to his son Leopold II.

FERENTINO, a t. of Central Italy, in the province of Rome, and about 50 m. s.e. of the city of Rome. Portions of the ancient walls are still standing, and the town contains the noted remains of an ancient theatre. The back wall of its stage, which is

136 feet long is thought to be Etruscan. The stage itself is Roman. There are also a cathedral and a castle. F. is the ancient Ferentinum, a city of the Hernici. Pop. about 10,700.

FERGHANA, a province of Russian Turkestan, comprising a valley surrounded on three sides by the w. ranges of the Thian Shan mountains; pop. over 700,000, of whom a large part are nomads. The productions are wheat, rice, maize, sorghum, millet, cotton, tobacco, madder, etc. The climate is equable and generally healthy. Rock salt, naphtha, gypsum, iron, lead, coal, and sulphur are found. The Russians have divided the province into seven districts. Chief town, Khokan.

FERGUS, a co. in Montana; 6762 sq. m.; pop. '90, 3514. Co. seat, Lewistown.

FERGUS FALLS, city and co. seat of Otter Tail co., Minn.; on the Red River of the North, 187 m. n.w. of St. Paul, and the Great Northern and Northern Pacific railroads. It is the centre of the Park region of the state, and is surrounded by forests of pine and hardwood, lumber and prairie land. It has abundant water power, large flour and woolen mills, high school, Norwegian Lutheran College, public library, hospital for the insane, churches, a court-house, a masonic temple, an Oddfellows' hall, banks, newspapers, water-works, and electric lights. Pop. 1890, 3772.

FERGUSON, ADAM, a Scottish philosopher and historian, was born (1723) at Logierait, Perthshire, where his father was parish minister. He studied at the universities of St. Andrews and Edinburgh, and was appointed (1745) chaplain to the 42d regiment, in which capacity he was present at the battle of Fontenoy, and is said to have charged the enemy sword in hand, among the foremost of the regiment. In 1757, he succeeded David Hume as keeper of the advocates' library in Edinburgh. He was next appointed professor in the Edinburgh university, first of natural philosophy, in 1759, and subsequently (1764), of moral philosophy—a subject which had always had great attractions for him. While holding this office, he accompanied the young earl of Chesterfield (1774) on his travels on the continent; and in 1778–79, he acted as secretary to the commission sent out by lord North to try to arrange the disputes between the North American colonies and the mother country. The state of his health induced him, in 1784, to resign his professorship, in which he was succeeded by Dugald Stewart. In 1793, he visited various parts of the continent; and on his return, took up his residence for some time at Neidpath castle, in Tweeddale, and latterly in St. Andrews, where he died, 22d Feb., 1816. His chief works are—*Essay on the History of Civil Society* (Lond. 1767); *Institutes of Moral Philosophy* (Lond. 1769); *History of the Progress and Termination of the Roman Republic* (Lond. 1783); and *Principles of Moral and Political Science* (Lond. 1792). The work by which he is best known is his *History of the Roman Republic*; this, together with the *Essay and Institutes*, has gone through a number of editions. All his works have been translated into German and French, and the *Institutes* has been used as a text-book in several foreign universities.

FERGUSON, JAMES, was b. (1710) near Keith, a village in Banffshire, Scotland. His father being a poor day-laborer, he enjoyed only three months of instruction at school, and his subsequent acquirements were the result of his own insatiable thirst for knowledge. His tastes lay principally for practical mechanics and astronomy; and while keeping sheep, to which he was early sent, he was constantly employed in making models of mills, etc., and at night in studying the stars. After working at various country employments, he took to drawing patterns for ladies' dresses, and copying pictures and prints with pen and ink. He then supported himself and his parents by drawing portraits, first in Edinburgh, and afterwards (1743) in London; his leisure time being all the while given to astronomical pursuits. In 1748, he began lecturing on astronomy and mechanics with great acceptance. He was elected a fellow of the royal society in 1763, and received from George III. a pension of £50. He now gave up portraits, and devoted himself to lecturing and writing on his favorite subjects. He died in 1776. F. was held in high esteem for the worth and amiability of his character, as well as for his extraordinary and self-taught acquirements. Few men have done more to promote a knowledge of the results of science, among those who have not the advantage of regular scientific training. His principal works are *Astronomy explained upon Sir Isaac Newton's Principles* (1756; sir David Brewster's ed., 2 vols., 1811); *Lectures on Mechanics, Hydrostatics, Pneumatics, and Optics* (1760); also edited by sir David Brewster in 1805; and *Select Mechanical Exercises*, with an autobiography (1773).

FERGUSON, JAMES, 1797–1867; b. Scotland; went to New York in 1800. He was one of the engineers who laid out the Erie canal, and in 1819–22, assistant surveyor in the boundary commission under the treaty of Ghent; and astronomical surveyor for that commission in 1822–27. He became first assistant of the U. S. coast survey in 1833, and in 1847, assistant astronomer of the U. S. naval observatory. He discovered the following asteroids: Euphrosyne in Sept., 1854; Virginia in 1857; Echo in 1860, for which he was awarded the astronomical prize medal by the academy of sciences of France. He was contributor to Dr. Gould's *Astronomical Journal* and to the *Astronomische Nachrichten*; also to the *Episcopal Church Review*, to the *Merchants' Magazine*, and to other standard publications.

FERGUSON, SAMUEL DAVID, D.D.; b. S. C., 1842; ordained priest in the Prot. Epis. church, 1868; rector of St. Mark's church, Harper, Liberia; was consecrated missionary bp. to Cape Palmas and ports adjacent, 1885. He is the first colored bp. of his communion.

FERGUSSON, JAMES, b. Scotland, 1808; educated in Edinburgh and in England, and went into business in India. This he soon gave up and journeyed through various parts of the east, chiefly with a view of studying the styles of architecture. One of the first results of his studies was *Illustrations of the Rock-cut Temples of India*. He also published *Picturesque Illustrations of Ancient Architecture in Hindustan; Essay on the Ancient Topography of Jerusalem*; and a *Historical Inquiry into the True Principles of Art, more especially with reference to Architecture*. This volume is the first of a projected work in three parts, comprising a universal compendium of past art—Hindu, Mohammedan, Gothic, etc. The materials collected for this work were used in his *Handbook of Architecture*, published in 1855. Later he issued an *Essay on a Proposed New System of Fortification*, by earthwork. A pamphlet of practical suggestions for the improvement of the British Museum and of the National Gallery was followed by a "New Design" for the latter at the academy exhibition of 1850. He is also the author of *The Palaces of Nineveh and Persepolis Restored*, published in 1851, and was the architect of the Nineveh court in the crystal palace, Sydenham. After 1859, he became one of the royal commissioners to inquire into the defenses of the United Kingdom. In 1862, Mr. Fergusson published a *History of the Modern Styles of Architecture* as a sequel to the handbook, and in 1865 remodeled the whole, and published it as *A History of Ancient and Modern Architecture*, in 3 vols. In addition to these works, he published, in 1868, *Tree and Serpent Worship*, with upwards of 100 plates and illustrations. In 1871, he received the royal gold medal, annually awarded to an eminent architect, or writer on architecture. His latest work is entitled *The Temples of the Jews and the other Buildings in the Haram Area at Jerusalem*. He d. 1886.

FERGUSSON, ROBERT, a Scottish poet, was b. at Edinburgh on the 17th Oct., 1750, and received his education at the university of St. Andrews, where he was in possession of a bursary founded by a person of his own name, and resided four years. Subsequently, he removed to Edinburgh, and was employed in the office of the commissary clerk. His poems were chiefly contributed to *Ruddiman's Weekly Magazine*, and gained him considerable local reputation. Unhappily, this reputation proved his ruin. His society was eagerly sought; and in that convivial time, he was led into excesses which permanently ended his health. He fell into a religious melancholy, and finally, through an accidental fracture of the skull, became totally deranged. He died on the 16th Oct., 1774, at the age of 23. His poems were published in 1773.

F.'s poems are distinguished by considerable humor, fancy, and purity of language, and he possessed great mastery over lowland Scotch. He sketches with liveliness contemporary life and incidents, and much of our knowledge of old Edinburgh is derived from his verses. His fame, however, rests quite as much upon his unhappy life and early death, and upon the circumstance that he was to some extent the forerunner of Burns, as upon the essential merits of his verse.

FERIÆ (Lat.), holidays during which political and legal transactions were suspended in ancient Rome, and slaves enjoyed a cessation from labor. F. were thus *dies nefasti*, the opposite of the *dies fasti*. See **FASTI**. Days which were consecrated to a particular divinity, on which any public ceremony was celebrated, and the like, were *feriæ*. In contradistinction to these, which were F. *publicæ* (public holidays), there were F. *privatæ*, which were observed by single families, in commemoration of some particular occurrence of importance to them or their ancestors. Birthdays, days of purification after a funeral, etc., were also observed as family *feriæ*. The public F. were divided into those which were always kept (*stativæ*) on certain days marked in the calendar; and those which were kept by command of the consuls or other superior magistrates on the occasion of any public emergency. "The manner in which all public F. were kept bears great analogy to our Sunday. The people generally visited the temples of the gods, and offered up their prayers and sacrifices. The most serious and solemn seem to have been the F. *imperativæ*; all the others were generally attended by rejoicings and feasting." See an elaborate article by Dr. Schmitz in Smith's *Dictionary of Greek and Roman Antiquities*. In Scotland, those days during which it was not lawful for courts to be held, execution to proceed, or any other judicial step to be taken, used to be called *feriat* times, but the expression is obsolete.

FERID-EDDIN-ATHAR, or **FERID-UDDIN-ATTAR**, 1119-1229; a Persian poet and mystic, who died at the age of 110 years. He was Mohammed ben Ibrahim, the son of a druggist, and brought up to his father's business. "Ferid-Eddin" was an honorary title, signifying "pearl of religion." To this he added "athar" (which means "druggist"), and so quite changed the real name. He studied the mystic philosophy of the Sufis, and was recognized as one of its principal representatives. He was a voluminous writer, leaving no fewer than 120,000 couplets of poetry. His most famous work is the *Mantic Utair*, or language of birds, an allegorical poem containing a complete survey of the life and doctrines of the Sufis. According to the poet, the birds, weary of a republic, longed for a king. As the lapwing, having guided Solomon through the desert, best knew what a king should be, he is asked whom they shall choose. "The Simorg in the Caucasus," is his reply. But the way to the Caucasus is long and dan-

gerous, and most of the birds excuse themselves from the journey. A few, however, set out; but by the time they reach the great king's court, their number is reduced to 30. The 30 birds, wing-weary and hunger-stricken, at length gain access to their chosen monarch, the Simorg; but only to find that they strangely lose their identity in his presence—that they are he, and he is they. In such strange fashion did the Persian poet image forth the search of the human soul after God, and its absorption into the divine.

FERINGHEE, the Eastern name for Europeans, whose land is called Feringistan, supposed by some to be a corruption of Frank and to date from the Crusades, while by others it is derived from the Varingii, Warings, Norsemen who entered into the service of the Byzantine emperors at Constantinople. In Bengal, the mixed descendants of the Portuguese, though differing in no respect but religion from the natives, are especially distinguished by the term *Feringhis*.

FERLAND, JEAN BAPTISTE ANTOINE, l'Abbé, Canadian author, was b. at Montreal, Canada, Dec. 25, 1805, was ordained a priest of the Roman Catholic church, and made vicar of Quebec in 1828. In 1847, while professor in the seminary of Nicolet, he distinguished himself for his courage during an epidemic of typhoid fever. He was appointed professor in the Laval University in 1855. He delivered a course of lectures on Canadian history from 1858 to 1862. He is best known for his *Cours d'histoire du Canada* (Vol. I., 1861) which was continued in Vol. II. by Laverdière. He died Jan. 8, 1864.

FERMANAGH, an inland co. in the s.w. of the province of Ulster, Ireland. It is 45 m. long, and 29 broad; area, 714 sq. m., and includes upper and lower lough Erne, and the smaller lakes, Melvin and Macnean. The surface is mostly a succession of mountains and hills, and the scenery varies. The lower lands are fertile. The chief rocks are limestone, with many cavities and underground water-courses, millstone grit, and old red sandstone. Some coal, iron, and marble occur. The chief rivers are the Erne and its tributaries, the Colebrooke, Woodford, and Arney. The soil in the low grounds is a deep rich loam, but in the limestone and sandstone districts it is cold and thin. The climate is mild and moist. Marsh-fevers prevail in summer and autumn near lough Erne. Pop. 1891, 74,170. Chief exports are oats.

FERMAT, PIERRE DE, a French mathematician, was b. at Toulouse in 1601, and at an early period, in conjunction with his friend Pascal, hit upon a very ingenious mode of considering figurate numbers, upon which he subsequently based his doctrine of the calculation of probabilities. F. employed himself greatly with the properties of numbers, and made many acute discoveries in regard to their composition and analysis. He also squared the parabola in a much simpler way than Archimedes at an earlier period had done, and made many other discoveries in geometry. His method of finding the greatest and least ordinates of curved lines was analogous to the method of the then unknown differential calculus. In addition to his scientific attainments, F. possessed an extraordinary knowledge of ancient and modern languages. He died at Toulouse in 1665. A collection of F.'s works appeared at Paris in 1679.

FERMAT A, in music, is the name given to a pause, or resting-point, generally marked by the sign \frown . The notes over which this sign is placed are prolonged beyond their true length. The F. is frequently found near the end of a part of a composition, which affords an opportunity for the singer or player to introduce an extempore embellishment.

FERMENTATION is the term applied to the change which occurs in one organic substance when influenced by another in a state of decay or putrefaction. The process was originally understood to include all the changes which matter of plant and animal origin undergoes when disunited from the living force, but is now restricted to certain of the changes. Thus, there are many substances, such as starch and sugar, which have no power of themselves to pass into decay, or change in composition through lengthened periods of time; whilst there is another class of substances, including albumen, fibrin, and caseine, as well as gelatinous tissues, mucus, etc., which, when exposed to moderately heated air in a moist condition, more or less rapidly begin to putrefy or decompose. The latter substances, viz., those which spontaneously pass into a state of change, are called *ferments*, and when they are brought into contact with sugar, etc., which otherwise would not be altered, they cause the latter to be broken up into simpler compounds; it is this process that constitutes fermentation. The ferment is always a body which has the power of rotting or becoming putrid, and is actually in a state of decomposition. Every substance which is liable to putrefy becomes, while putrefying, a ferment; and in this condition acquires the property of setting agoing the process of F. in any second body capable of it, and retains the power till it is so far decomposed that the putrescence is over. The ferments are very widely distributed in organic matter, and hence, whenever a plant or an animal dies, the process of F. proceeds more or less rapidly. The most important kind of F. is that known under the designation of *vinous*, and which forms part of the processes in the preparation of alcohol, beer, wine, etc. It consists in the action of a peculiar ferment called yeast (q.v.) upon a saccharine

liquid, when the sugar, $C_6H_{12}O_6$, is decomposed into two molecules of alcohol (each C_2H_5OH) and two molecules of carbonic acid (each CO_2). In this change it will be observed that the yeast, whilst it causes the change, does not unite directly or indirectly with any of the constituents of the sugar. The vinous F. proceeds best at a temperature ranging from 60° to 80° F., the mean and more desirable being about 70° F. The process itself causes the development of heat, and recourse must be had, therefore, to large airy rooms, where the fermenting tuns or vessels are arranged, and also to the circulation of cold water in pipes distributed round the interior of the vessels, and in contact with the liquid. See BEER.

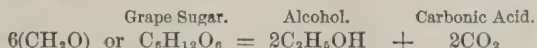
The *lactic acid* F. takes place in milk when it begins to sour. The caseine of the milk acts the part of the ferment, and it causes the change in the sugar of milk, which is in part resolved into lactic acid, $C_3H_5O_3$. The latter then curdles the caseine, and the milk becomes clotted. When the milk still further sours, and the material is kept at a temperature of 77° to 86° F., the *butyric acid* fermentation takes place, in which the putrefying caseine changes the sugar (q.v.) of milk into butyric acid, $C_4H_7O_2$.

The *viscous* or *mucus* F. occurs when the juice of the beet-root, dandelion, ash-tree, etc., is allowed to decompose at a temperature of 90° to 100° F., when the albuminous matter present causes the sugar to ferment into lactic acid, mannite, a gummy substance, some alcohol, and various gases. The same kind of F. occurs when boiled yeast or boiled gluten is added to ordinary sugar.

The remaining processes of F. are the *benzoic* F., yielding, amongst other matters, the essential oil of bitter almonds (q.v.); the *sinapic* F., which occurs in mustard when moistened with water, and during which the pungent oil of mustard is developed; and the *acetous* F., which is, however, not a true instance of F., as the oxygen of the air is required to complete the change. See ACETIC ACID.

Fermentation is most accurately described as due to natural processes in which bubbles of air seem to be generated, producing what is called effervescence. Effervescence is, however, only a phenomenon which accompanies one of the most familiar instances of fermentation, and does not exist in all its forms. The commonest examples of fermentation are: the change of the juices of fruits to wine, cider, etc.; the souring of milk; and the putrefaction of animal or vegetable matter. As these changes occur without any notably exciting cause, they have been thought to be spontaneous; but no such thing as simple spontaneity exists in the case. On the contrary, experiment shows that no fermentable chemical species will ferment except it is in the presence of water, and is kept by that water in contact with some specific substance which by its presence excites and maintains the chemical activity of the kind in question. The substance which is thus the occasion of the chemical action is called a ferment. Even the simple fact of presence is not deemed to be enough. The ferment must itself change, but the cycle of change may cause a continuous reproduction of the agency, and thus result in the continuity of the fermentation.

Vinous fermentation may be selected for illustration, as one which is familiar in some of its many illustrations, such as the making of wine from grapes and currants, cider from apples, beer from grain, etc. The juice of grapes is an intensely sweet yellowish liquid, which may be made perfectly limpid and transparent by filtration through bibulous paper. If thus clarified, it will remain unchanged indefinitely; but if to it be added even a small quantity of the unclarified juice, fermentation will ultimately begin, and the liquid will become turbid. A finely divided substance is formed in the liquor, which rises to the surface as a scum, and is called yeast. The production of yeast is accompanied by the evolution of carbonic acid, which also comes to the surface, and is retained in bubbles by the viscous nature of the scum. The chemical change once begun becomes accumulatively more active in the presence of the increasing volume of yeast, until it reaches a climax, and then it dies away because the whole substance has been acted upon. The yeast settles to the bottom; a clear liquid remains, whose sweetness has given place to a vinous taste; from which it appears that the sugar has vanished, and instead, a new, volatile, inflammable substance called alcohol is present. The temperature of vaporization being lower for alcohol than for water, it may be driven off by processes of distillation, each repetition furnishing a greater proportion of alcohol, and may finally be obtained in a pure, or "absolute," form, when treated with some chemical which takes away the remnant of the water. It appears then that the vinous fermentation has occasioned a change in which sugar has given place to alcohol. The analytical statement of this change is expressed by Gay Lussac's formula, substantially, but not critically. He assigned to grape sugar the simple formula CH_2O , and for the reaction gives the equation—



or, 180 units of sugar give 92 units of alcohol and 88 of carbonic acid. Cane sugar has the formula, $C_{12}H_{22}O_{11}$, or $2(C_6H_{11}O_5) - H_2O$, or, two equivalents of grape sugar with one of water. It appears, on further investigation, that certain other compounds are formed

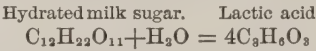
—thus 100 parts of cane sugar become, by absorption of water, 105.4 parts of glucose, which yield approximately—

| | |
|------------------------------|-------|
| Alcohol..... | 51.1 |
| Carbonic acid..... | 49.4 |
| Succinic acid..... | 0.7 |
| Glycerine..... | 3.2 |
| Matter passing to yeast..... | 1.0 |
| Total..... | 105.4 |

even this does not account for the formation of a small quantity of fusel-oil, and some ethers.

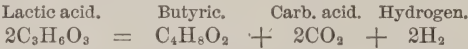
Vinous fermentation is induced by *saccharomyces*, a genus of fungi, consisting of minute cells, sometimes isolated, sometimes grouped, but never forming a continuous tissue. Of the several species, *S. cerevisia*, the fungus of common yeast, used in making beer, is most important. Its cells have a diameter of about $\frac{1}{100}$ millimeter. Of the genesis of the yeast plant little is known. Its germs abound in harvest time about the vines and stalks of the grape, and in breweries and wine-cellars, but they are by no means generally diffused through the air.

The change in lactic fermentation is expressed by the equation—



Ordinary glucose dissolved in milk ferments to lactic acid, with the milk sugar, up to a certain maximum of acidity, when the change stops. Chalk or carbonate of zinc neutralizes the acid, and revives the fermentation. The agent of this fermentation consists of microscopic ovoid cells, which Pasteur calls *Penicillium glaucum*. Lactic ferment sometimes annoys brewers as an impurity in their yeast. The lactic ferment is not chargeable as the agent which ordinarily sours milk; this result is caused by a motionless bacterium which Lister calls *B. lactis*. Yet this bacterium, if made to pass through a certain round of changes, also produces lactic fermentation. The germs of this bacterium are thought to abound in the air of dairies and cow-stables, but are not generally diffused through the air.

Butyric fermentation is a change which occurs in milk or cheese, in which the lactic acid is broken up, as shown by the equation—



It is caused by the presence of an animalcule called a *vibrio*. This fermentation is one of a series of fermentations called putrefaction, of which the chemical reactions are very intricate. The agents are, with scarcely an exception, bacteria and vibrios.

FERMENTED AND DISTILLED LIQUORS, STATISTICS OF. A good comparative view of the growth and extent of the liquor traffic in the U. S. may be gained from the following tables, taken from two censuses :

1870.

| | Establish-ments. | Capital. | Hands Employed. | Wages. | Value products. |
|----------------------------|------------------|--------------|-----------------|-------------|-----------------|
| Distilled Liquors. | 719 | \$15,500,000 | 5,131 | \$2,000,000 | \$36,100,000 |
| Malt Liquors..... | 1,972 | 48,700,000 | 12,443 | 6,700,000 | 55,700,000 |
| Vinous Liquors..... | 396 | 2,300,000 | 1,486 | 200,000 | 2,200,000 |
| Total..... | 3,089 | \$66,500,000 | 19,060 | \$8,900,000 | \$94,000,000 |

1880.

| Distilled Liquors..... | 844 | \$24,200,000 | 6,502 | \$2,600,000 | \$41,000,000 |
|------------------------|-------|---------------|--------|--------------|---------------|
| Malt Liquors..... | 2,191 | 91,200,000 | 26,220 | 12,100,000 | 101,000,000 |
| Vinous Liquors..... | 117 | 2,500,000 | 967 | 200,000 | 2,100,000 |
| Total..... | 3,152 | \$117,900,000 | 33,689 | \$14,900,000 | \$144,100,000 |

The following table, compiled from the official reports of the Internal Revenue Department, gives the revenue derived from distilled and fermented liquors for ten years :

| Fermented | | | Fermented | | |
|----------------|--------------|-------------|----------------|--------------|--------------|
| Year. | Spirits. | Liquors. | Year. | Spirits. | Liquors. |
| 1875 | \$52,081,991 | \$9,144,044 | 1880 | \$61,185,509 | \$12,289,803 |
| 1876 | 56,436,365 | 9,571,251 | 1881 | 67,153,975 | 13,700,241 |
| 1877 | 57,469,430 | 9,480,789 | 1882 | 69,873,408 | 16,153,920 |
| 1878 | 50,420,816 | 9,937,052 | 1883 | 74,368,775 | 16,900,616 |
| 1879 | 52,570,285 | 10,729,320 | 1884 | 76,905,385 | 18,084,954 |

According to the Report of the Statistical Bureau for 1891, there were consumed in the United States during the year 1890, 87,829,562 gals. of distilled spirits; 23,956,981 gals. of wines; and 855,792,335 gals. of malt liquors; a total of 972,578,878 gals., or 15.53 gallons for every man, woman, and child in the United States.

In the same year there were consumed in the production of distilled spirits by American distillers, 25,202,901 bushels of grain, and 2,198,538 gals. of molasses. New York is the greatest producer of fermented liquors, having made in 1890, a total of 8,572,223 barrels. Next comes Pennsylvania, with 2,762,352.

FERMENTED LIQUORS are alcoholic beverages made by fermentation of saccharine fluids and juices; the principal being the different kinds of *ale* or *beer*, made by fermentation of an infusion of malt, chiefly of barley, but also sometimes of other kinds of grain; and *wine*, made by fermentation of grape-juice. *Cider* is made by fermentation of the juice of apples; *perry*, of that of pears; *palm-wine*, by fermentation of the sap of different kinds of palm. Fermented liquors, commonly called wines, are also made from the juice of various kinds of fruit, as currant wine from that of the red currant; and from the juice of some roots, as parsnip wine from that of the parsnip, etc. The sap of the American aloe, or *agave* (q.v.), yields the fermented liquor called *pulque*, much used in Mexico. A wine is made from the sap of the birch, and that of some other trees is used for a similar purpose. *Mead* is a fermented liquor made from honey. From every fermented liquor, a kind of *spirit* may be obtained by distillation.

FERMO, a t. of Italy, in the province of Ascoli Piceno, is situated on a rocky height 4 m. from the Adriatic, and 32 m. s.s.e. of Ancona. It is well-built and fortified, surrounded with walls and ditches, is the seat of an archbishop, and has a cathedral and an elegant theater. Formerly F. possessed a university. It has some trade in corn and wool. Pop. about 17,800. In the immediate vicinity are the ruins of the ancient Firmum, whose name F. inherits. Firmum had been a Roman colony from the year 264 B.C.

FERMOY, a t. in the e. of Cork county, Ireland, chiefly on the right bank of the Blackwater, 19 m. n.e. of Cork city. Its origin dates from the 12th c., when it was the seat of a great Cistercian abbey; but its present importance, which commenced in the end of last century, is due to Mr. (afterwards Sir John) Anderson, who introduced mail-coaches into Munster. The hills to the s. of the town rise in Knockinskeagh 1388 feet. F. is handsomely built and regularly laid out. It has a large ecclesiastical establishment (Roman Catholic), consisting of a church, a bishop's house, convents with large schools, and a college, on a hill rising from the Blackwater. A bridge of 13 arches, built in 1689, crosses the river. Infantry and cavalry barracks stand on the left bank of the river, and command the approach to Cork. F. has a trade in agricultural produce, and contains flouring mills. Pop. '61, 8,705; '91, 6421.

FERN, FANNY. See PARTON, SARA PAYSON (WILLIS).

FERN, MALE, a name given, in consequence of an erroneous notion, long since exploded, to a fern very common in the woods of Britain and of the continent of Europe, the *aspidium filix mas* of some botanists, and *lastræa filix mas* and *nephrodium filix mas* of others. The fronds are bipinnate; the pinnules oblong, obtuse, and serrated; the sori near the central nerve, orbicular, kidney-shaped, and fixed by the sinus; the stipes and rachis chaffy. If not one of the very finest of our ferns, it is certainly a chief ornament of many of our woods, and a plant of very considerable beauty. The subterranean stem (rhizome) is officinal. It is about a foot long and of the thickness of a quill, almost inodorous, with a nauseous sweet taste, becoming astringent and bitter. It was anciently used as an anthelmintic, and its use has been revived, especially in cases of tapeworm, in which it is believed to be very efficacious. Its anthelmintic powers are due to a thick, almost black volatile oil which it contains, and which is now itself also used in medicine. See adjoining illus., fig. 7.

FERN, SWEET, *Comptonia asplenifolia*, a shrub of the natural order *amentaceæ*, sub-order *myricææ*, a native of the sterile hills of North America, forming a small bush with linear pinnatifid, fern-like leaves. Its leaves have a powerful aromatic fragrance when rubbed. It is tonic and astringent, and is much used in the United States as a domestic remedy for diarrhea.

FERNANDEZ, JUAN, a Spanish discoverer, b. about 1538. While sailing along the coast of South America early in the 16th c., he found that the winds near the shore were almost constantly from the s., and that they greatly retarded his progress. Standing off shore he met the trade-winds, which blew from a different direction, and made a voyage so remarkable for its short time that he was, on returning to Spain, arrested on a charge of sorcery. By some unusual leniency, however, his explanation was accepted, and he was acquitted. During one of his voyages, 1563, he discovered the islands which now bear his name. See JUAN FERNANDEZ. He was so pleased with their fertility and beauty, that he asked for their possession, and the Spanish government gave them to him in 1572. A colony was established, but it was not permanent, and the only relic of it is the goats, which have continued to thrive ever since. In 1574 he discovered the islands of St. Ambrose and St. Felix. His companions during a voyage made in 1576 say that he saw a large island or continent in the southern ocean. This, if not an illusion, may have been New Zealand, or Australia. Died about 1602.

FERNANDINA, city, port of entry, and co. seat of Nassau co., Fla.; on Amelia island, Amelia river, and the Florida Central and Peninsular railroad; 33 miles n. by n.w. of Jacksonville. It has an excellent harbor, is a popular winter resort for people from the

north, and is principally engaged in oyster canning, the manufacture of lumber, plastering fiber, and other articles, and the shipment of lumber and phosphates. Pop. '90, 2803.

FERNANDO DE NORONHA, a lonely island of the southern Atlantic, in lat. $3^{\circ} 50' S.$, and long. $32^{\circ} 25' W.$, about 125 m. from the coast of Brazil, to which empire it belongs. It is about 8 m. in length. The surface is rugged, and rises into a peak about 1000 ft. high, the upper part of which is very steep, and on one side somewhat overhanging. The island is mostly covered with wood; but as little rain falls, there is not much of tropical luxuriance. It is used as a place of banishment for Brazilian criminals. No woman is allowed to land on the island. Pop. 2,000, half of whom are convicts, who cultivate small farms.

FERNANDO PO, an island on the w. coast of Africa, in the bight of Biafra, is situated about 20 m. from the nearest point on the shore, and is about 44 m. long and 5 to 20 m. broad. The appearance of this island from the sea is exceedingly picturesque and beautiful. It is traversed by a mountain ridge, which, in Clarence peak, rises to the height of 9350 ft., and is fertile, well watered, and in many parts thickly wooded. Besides swarms of monkeys, some of which are of great size, the island contains many goats and sheep in a state of nature. The climate, always excessively hot, is rendered more intolerable during the rainy season by a pestilential wind from the continent. The population, which is composed of the native negroes, is variously estimated at from 15,000 to 25,000. The island is used as a place of exile for criminals. The island takes its name from the Portuguese navigator, Fernando, or Fernão do Pao, who discovered it in the latter part of the 15th century. In 1778 it was occupied by Spain. The English, with the consent of Spain, made an attempt in 1827 to form a settlement on the island, but abandoned it in 1834. A few years later it was again taken possession of by Spain. The capital is Clarence Cove, known to the Spaniards as Santa Isabel.

FERNAN-NUNEZ, a small t. of Spain, in the province of Cordova, and 10 m. s. of the town of that name. It has some linen and woolen manufactures. Pop. 5,500.

FERNS, *Filices*, an order of acrogenous or cryptogamous plants, divided by some botanists into several orders; whilst some make *filices* a sub-class, and include in it *lycopodiaceæ*, *marsileaceæ*, and *equisetaceæ*. See these heads. F. are either herbaceous perennial plants, or more rarely trees, the root-stock or the stem producing leaf-like *fronds* (often called leaves), which are sometimes simple, sometimes pinnated, or otherwise compound, exhibit great variety of form, and are generally coiled up (*circinate*) in bud. The fronds are traversed by veins, generally of uniform thickness, which are simple or forked, or netted, sometimes produced from the sides of a midrib or primary vein, sometimes from a primary vein on one side, sometimes radiating from the base of a frond or segment of a frond. The fructification takes place either on the lower surface or on the margin of the fronds, and arises from the veins. The spores are contained in capsules or spore-cases (*thece*, *sporangia*), which are often surrounded with an elastic ring, and are either naked or covered with a membrane (*involucre* or *indusium*), and are generally clustered in round or elongated or kidney shaped masses (*sori*). The margin of the frond is sometimes folded so as to cover the spore-cases, and sometimes, as in the flowering fern (*osmunda*) (q. v.), the fertile part of the frond is so transformed that its leaf-like character entirely disappears, and it becomes a spike or panicle. The spore-cases burst at their circumference, or irregularly, scattering the spores which germinate into the prothallus, a minute, kidney-shaped cellular expansion with unicellular root hairs. On the under-surface of this, arise male and female reproductive organs, the *antheridia* and *archegonia*. The former develop ciliated spiral filaments, the "antherozoids;" the latter, an oosphere, from which, when fertilized, the "fern" arises; an alternation of generations (q. v.) thus taking place.—The species of F. are about 2,500. They are found in all parts of the world, but are fewer towards the poles than within the tropics, and fewer in continental than in maritime countries, abounding exceedingly in mountainous tropical islands, as in Jamaica. Many of them delight in moisture and shade, although some are found in the most exposed situations. Some of them resemble mosses in size and appearance; whilst tree ferns (q. v.) resemble palms, and sometimes attain a height of 40 feet. A few are climbers. One climbing species (*lygodium palmatum*) is found in North America as far n. as Boston.—F. are divided into *polypodiæ*, *hymenophyllæ*, *gleicheniæ*, *schizæ*, *osmundæ*, *danææ*, and *ophioglossæ*, of which sub-orders (or orders) the first, second, fifth, and seventh alone contain British species, and the first contains a great majority of all ferns.—The root-stocks of some F. contain so much starch that they are either used as food, or food is prepared from them, particularly those of the tara (q. v.) F. in New Zealand and Van Diemen's Land, and those of *aspidium* (or *nephrodium*) *esculentum* in Sikkim and Nepal; also the stems of some of the tree-ferns, as of *cyathea medullaris* in New Zealand, and *alsophila spinulosa* in India. The young and tender fronds of some F. are occasionally used as pot-herbs in the Highlands of Scotland, Norway, the Himalaya, etc. The fronds are generally mucilaginous, slightly aromatic and astringent. Those of some species of maidenhair (q. v.) are used for making *capillaire*; whilst the bitter and astringent root-stocks of some F. are occasionally used in medicine, as those of the male fern (see FERN, MALE) and the Peruvian *polypodium caliguala*, particularly as anthelmintics. The fronds of a few species are delightfully fragrant.—The cultivation of F. is now in many places successfully conducted on a somewhat extensive scale, both in the open air and in hot-houses; and to such an extent has the occupation of fern-collecting reached, that many excellent

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FERNS.—1. *Polypodium vulgare* (common Polypody); *a*, division of frond with sori (fruit). 3. *Asplenium Trichomanes* (Dwarf Spleenwort); *a*, pinna, with sori. 4. *Asplenium* (Fern). 6. *Athyrium* (*Asplenium*) *Filix foemina* (Lady-Fern); *a*, pinnule, with sori; *b*, section of sporangium; *c*, *d*, *e*, *f*, development of prothallium and young fern; *g*, margin; *h*, sporangia; *i*, cross-section of rhachis. 9. *Scolopendrium officinarum* (Stag-horn Fern); *a*, pinna, with sori; *b*, section of sporangium; *c*, cross-section of rhachis; *d*, *e*, *f*, development of prothallium and young fern; *g*, margin; *h*, sporangia; *i*, cross-section of rhachis.



ts); *b*, sporangium (spore-case). 2. *Polypodium* (*Phegopteris*) *Dryopteris* (Beech-Fern). *ita-muraria* (Wall-rue); *a*, division of frond in fruit. 5. *Adiantum cuneatum* (Maidenhair); *b*, indusium. 7. *Aspidium Filix-mas* (Male Fern. Shield-Fern); *a*, pinnule, with sori; *b*, calicle on rhachis. 8. *Pteris aquilina* (Brake); *a*, pinnule, with fructification under reflexed indusium. 10. *Botrychium Lunaria* (Moon-wort); *a*, sporangium.

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treatises on this subject alone have been written and elaborately illustrated. Amongst others, we may mention *British Ferns* (1s.), published by Routledge, London, as an excellent handbook, while the magnificent nature-printed work, published 2 vols., royal 8vo, by Henry Bradbury, supplies all needful information. Wardian cases, filled with them, have also become common, and are most pleasing ornaments of apartments. The principal species will be noticed under their particular heads. Ferns of many kinds formed a prominent feature in the vegetation of the early geological ages, and are found at present in every quarter of the globe, being comparatively few and small in cold climates and large and abundant in the tropics. They grow from a woody stem that first creeps along or under the ground, then becomes erect, and sends forth from the sides, or at the top, leaves or fronds of varied and most curious patterns. They vary in size in different climates, from herbaceous perennial plants with a slight stem producing leaves often less than half an inch in length, to trees rising in the tropics to a height of from 50 to 60 ft., and sending out at the top a beautiful crown of fronds from 8 to 20 ft. in length. Ferns are fructified from the lower face or the edges of the fronds, on which are collections of capsules filled with seeds or spores. A spore on germination produces a structure which, compared with its immediate parent, is very small, and bears no resemblance to it in form or texture. It is called the prothallium, and its function is entirely reproductive; it develops sexual organs of two kinds, archegonia and antheridia, either on the same or different prothalia. Hence, in contradistinction to the sporophore—the function of which in this group of plants is purely vegetative—the prothallial generation is termed the oophore. The whole group of ferns (pteridophyta) has been classed as follows:

PTERIDOPHYTA.—Cormophyta with two distinct stages in the life-cycle. Sporophore with high vegetative differentiation. Oophore inconspicuous and destitute of vascular tissue.

Class I. *Filicinae*.—Leaves highly developed. Sporangia numerous on the fertile leaves.

Sub-class 1. *Filices*.—Leaves without stipular appendages. Sporangia epidermal, containing spores of one kind developed in each from a single primary mother-cell.

Sub-class 2. *Stipulatæ*.—Leaves with stipula-like appendages. Sporangia containing spores of one kind developed in each from many endogenous primary mother-cells.

Class II. *Equisetinae*.—Leaves rudimentary. Sporangia 5 to 10 on the fertile leaves.

Class III. *Lycopodiinae*.—Leaves small (except isoetes), simple. Sporangia solitary.

Sub-class 1. *Lycopodiaceæ*.—Spores of one kind.

Sub-class 2. *Ligulatæ*.—Spores of two kinds.

In addition to accompanying illus., see LYCOPODIACEÆ, vol. IX.

FER OLIGISTE is a mineralogical term applied to a variety of anhydrous red oxide of iron (Fe_2O_3), otherwise called *specular iron ore*. The famous Swedish, Russian, and Elba iron are in greater part prepared from this iron ore. The natural position of F. O. is in the primary rocks. See IRON.

FEROZABAD, a t. of India, in the British district of Agra, n.w. provinces, 24 m. e. from Agra. It is the principal place of a pergunnah of the same name. It was formerly named Chandwar, and was a place of much greater importance than at present. Its fine edifices are mostly deserted and in ruins; most of the inhabited houses being cottages thatched with straw. It is surrounded by a wall. Pop. '91, 15,300.

FEROZEPORE, or **FIROZPUR** (so called from its founder, Feroze Toghluq, who reigned in Delhi from 1351 to 1388), in the Punjab, stands about 3 m. from the left or s.e. bank of the Sutlej, in lat. $30^{\circ} 55'$ n., and long. $74^{\circ} 35'$ east. At one time a large and important town, as its massive fortifications and extensive ruins still indicate, it had sunk into poverty and insignificance before it actually came, in 1835, into the possession of the English. Since then the place has regained much of its former consequence, holding out, with its wide streets and its colonnaded bazars, the promise of a grand emporium of commerce. Politically, too, F. has become prominent under British supremacy, having been a starting-point, whether for war or for negotiation, in many of the dealings with Afghanistan and the Punjab. In connection with this feature in its history, the city contains a monumental church in honor of the memory of those, both privates and officers, who fell in the various conflicts with the Sikhs. The pop. in '91, was 50,430.—The district of the same name has an estimated area of 4302 sq. m., and a pop. '91, of 887,000. It is now in part either barren or covered with jungle, but the ruins of towns and villages indicate that it must have been at one time both more fertile and more populous.

FEROZESHAH, a village apparently within the district of Ferozepore, and situated about 10 m. e.s.e. of the town of that name, is in lat. $30^{\circ} 52'$ n., and long. $74^{\circ} 50'$ e., lying about 12 m. from the left bank of the Sutlej. It claims notice mainly as the scene of the second in order of the four great battles of the first Sikh war. The conflict in question, which lasted two days, took place in Dec. 1845, ending in the rout of the

natives and the capture of their intrenchments. The British army was commanded by sir Hugh Gough and sir Henry Hardinge; and, as in the victory of Mudki, gained only three days before, it sustained heavy loss.

FEROZESHAH CANAL, a work, including its branches, of 240 m. in length, demands detailed notice as well for its historical interest as for its economical value. It dates back as far as 1356, owing its origin, as well as its name, to Feroze Toghluq, king of Delhi. Viewed as a whole, it leaves the right bank of the Jumna in lat. 30° 19' n.; and, after sweeping round so as to skirt Sirhind, a territory on the Sutlej, it rejoins its parent stream at Delhi in lat. 28° 39', thus measuring, in mere difference of latitude, 100 geographical miles. This artificial water-course, intended principally for the purposes of irrigation, seems to be equally creditable to native enterprise and native skill. But, as nothing of the kind appears to be permanent in the east, this noble channel was so much neglected, that, in the beginning of the 17th c., it was cleared out by Vizier Ali Murdan Khan, who, in point of fact, was the first to carry it, through its lower half, back into the Jumna. Finally, the entire line has, during this 19th c., been again repaired and improved by the British government. In the light of repeated drought and famine, the importance of such undertakings as the Feroze Shah canal can scarcely be overrated.

FERRANDI'NA, a t. in the s. of Italy, in the province of Basilicata, stands on a height on the right bank of the Basento, 35 m. e.s.e. of Potenza. Good wine is produced in the neighborhood. Pop. about 9,200.

FERRA'RA, the most northern of the Italian provinces that are washed by the Adriatic. It extends immediately s. of the Po, between the main branch of which, and the Po di Primaro, it is for the most part inclosed. As one of the old delegations, it had an area of 1180 sq.m., with a population amounting to 244,524; but according to the *Statistica Administrativa del Regno d'Italia*, published in 1861, the province had undergone certain modifications, and its pop. was then only 194,161; in 1895 it was 254,582; area, 1012 sq. m., for the most part swamp and lake. Many rivers and canals intersect it. Between the Po di Volano and the Po di Primaro, the marshes become very extensive, and receive the name of *Valli di Comaccio*. This province produces great quantities of fish, affords good pastures, and carries on a great trade in corn and hemp. It was at one time a dukedom under the house of Este, but on the failure of a legitimate male heir, Pope Clement VIII. wrested it from this family, and annexed it to the states of the church in 1598. It became part of the kingdom of Italy in 1860.

FERRA'RA, an ancient city of Italy, capital of the province of the same name, is situated in a low marshy plain in the delta of the Po, and about 4 m. s. of the main branch of that river, 28 m. n.e. of Bologna, and 40 m. n.w. of Ravenna. F. was first made a walled city by the exarch of Ravenna about the close of the 6th c., and in the following century (661 A.D.) became the seat of a bishop. In the middle ages it was the great commercial emporium of Italy, and the seat of a court renowned throughout Europe; but during the papal rule it had a peculiarly deserted appearance; grass grew on the pavements of its broad and regular streets, and its churches and palaces fell into decay. It is surrounded with walls, and is strengthened by bastions and a fortress. The old castle, or ducal palace, once the residence of the dukes of Este, but later, until 1860, occupied by the papal legates, rises like a huge rock, is strengthened with corner-towers, and surrounded by a ditch. Its ecclesiastical edifices, which are very numerous, and of which the churches of Santa Maria degl' Angeli and of San Benedetto are the most remarkable in point of architecture, are rich in paintings by the great masters of the Ferrara and Bologna schools. Besides their valuable paintings, these churches contain numerous sculptured monuments of famous persons; the church of San Francesco has a curious echo with sixteen reverberations. The university, founded in 1264, was reorganized in 1402, closed in 1794, and reopened in 1824. It is in high repute as a school of medicine and jurisprudence, and is well attended. It has an excellent library, which, besides a variety of MSS., missal paintings, and old editions of printed works, contains several of the works of Tasso and Ariosto in their own hand. F. is specially remarkable for its art associations. Under the patronage of the dukes of Este, it produced a school of painters who rank high in the history of art; while in literature the name of F. is immortalized through its connection with those of Tasso, Ariosto, and Guarini. At the period of its greatest prosperity, F. had about 100,000 inhabitants, but in 1872 it had a population of only 33,327; in '81 of 30,695; and in '94 of 86,000.

In 1849 the Austrians took possession of the town, but were compelled to abandon it at the commencement of the Italian campaign in June, 1859. In April, 1860, F., with the state of which it is capital, was formally annexed to the kingdom of Italy under Victor Emmanuel.

FERRA'RA, COUNCIL OF. The council of Basle, convened in 1431 to promote the reform of the church, having entered heartily into the work, was opposed by Pope Eugenius IV., who, in 1437, issued a bull, transferring the sessions to Ferrara. He was obeyed by only Cardinal Julian, the president, and four bishops; the council itself con-

tinued in session at Basle, declaring the act of the pope in attempting to transfer it illegal, and pronouncing against him sentence of suspension. To the five delegates, however, who met at Ferrara, others fresh from their homes were added, so that at the second session 72 bishops were present, over whom the pope presided. These were soon joined by the emperor from Constantinople, John Palæologus, who brought with him patriarchs, bishops, and other ecclesiastics, amounting in all to 700 persons. His object in coming was to effect the reunion of the Greek and Latin churches, in the hope that he could thus secure the aid of the west against the Turks, who were then pressing hard upon the empire, and were destined (as afterwards shown) soon to overwhelm it. The points of difference between the churches formed the chief subjects of discussion until the opening of the year 1439, when, on the plea that the plague was prevalent at Ferrara, the sessions were transferred to Florence. (See FLORENCE, COUNCIL OF.)

FERRA' RI, GAUDENZIO, sprung from a family which followed a career of art as if by inheritance, was born at Valdugia, in the Milanese, in 1484. A scholar of Andrea Scotto and Perugino, and the chosen associate and friend of Raphael, his own creations may be said to have caught some inspiration from each of these three great masters, while they also unmistakably reflect genius of a bold, unshackled originality. The chief characteristics of F.'s style are correct and vigorous delineation, extreme vividness and delicacy of coloring, noble grace of form and attitude, and unsurpassable art in the classic disposal of drapery. Being one of the most laborious artists of his day, he has executed innumerable paintings both in *fresco* and in oil, the greater part of which are possessed by the Lombard galleries. His most comprehensive work, the frescos at Barallo, in Piedmont, represents the Passion; the "Martyrdom of St. Catherine," to which he owes his brightest fame, is in the Milanese collection of paintings. He died in 1550, having formed some good scholars, the chief of whom is Andrea Solario.

FERR RATES are combinations of ferric acid (FeO_3), a weak unstable compound of iron and oxygen with bases. See IRON.

FERREIRA, ANTONIO, one of the classic poets of Portugal, was born at Lisbon, 1528. He was educated at Coimbra, where he occupied himself with the study of the Italian and Latin authors, more especially Horace, whom he almost rivaled in conciseness, but not in elegance of expression. After holding for some time the office of a professor at Coimbra, he obtained a civil appointment of some importance at the court of Lisbon. He carried to perfection the elegiac and epistolary styles, already attempted with success by Sá de Miranda, and transplanted into Portuguese literature the epithalamium, the epigram, ode, and tragedy. His *Ines de Castro* is the second regular tragedy that appeared after the revival of letters in Europe, the first being the *Sophonisba* of Trissino. It is still regarded by the Portuguese as one of the finest monuments of their literature, for its sublime pathos and the perfection of its style. The works of F. are not numerous, as his official duties left him little leisure. He died 1569. All his works are distinguished by soundness and depth of thought. His expression is strong rather than sweet, is extremely animated, and full of that fire which elevates the mind and warms the heart. His efforts after brevity, however, frequently led him to sacrifice harmony to thought. His *Poemas Lusitanos* were first published at Lisbon, 1598, and the *Todas as obras de Ferreira* in 1771. Compare Sismondi's work, *La Littérature du Midi* (Paris, 1813), and Bouterwek's *Geschichte der neuern Poesie und Beredsamkeit* (12 vols. Gött. 1801-19).

FERRET, *Mustela furo*, an animal of the weasel family (*mustelidae*), so nearly allied to the polecat (q. v.) that may regard it as a mere domesticated variety. It is of rather smaller size, the head and body being about 14 in. long, the tail $5\frac{1}{2}$ in., the muzzle rather longer and more pointed, the head rather narrower; and the color is very different, being yellowish, with more or less of white in some parts, there being two kinds of hair, the longer partly white, the shorter yellow. The eyes are pink. It is, however, much more susceptible of cold than the polecat, and requires careful protection from it in climates where the polecat is a hardy native. It was imported into Europe from Africa, and was well known to the Romans, being anciently employed, as it still is, in catching rabbits, for which purpose it is often sent into their burrows muzzled, or "coped," by means of a piece of string, to drive them out into nets, or, with a string attached to it, it is allowed to seize a rabbit in the burrows, and is then drawn out, holding it fast. The usual plan, however, is to let the F. have free range of rabbit-holes unmuzzled, the rabbits being shot as they bolt. Attention to warmth and cleanliness is essential to the health of ferrets. They are capable only of partial domestication, acquiring a kind of familiarity with man, and submitting with perfect quietness to his handling, but apparently never forming any very decided attachment; and they never cease to be dangerous if not carefully watched, especially where infants are within their reach. If allowed any measure of freedom, they are ready to attack poultry, and kill far more than they can devour, merely sucking the blood. They generally breed twice a year, each brood consisting of six or nine. The female sometimes devours the young ones, in which case another brood is speedily produced.

FERRIC OXIDE, the PEROXIDE, or SESQUIOXIDE OF IRON, Fe_2O_3 . The anhydrous peroxide, as found in nature, crystallizes in flattened, rhomboidal tablets, nearly black

and very brilliant, known to mineralogists as "specular iron;" it also occurs in compact red masses, called "red hematite." Prepared artificially, by calcining ferric protosulphate, or copperas, it is a red powder, called colcothar, used as a paint, and for polishing silver and mirrors. Magnetic iron ore is commonly held to be a compound of ferric oxide and ferrous oxide, $\text{Fe}_2\text{O}_3 + \text{FeO} = \text{Fe}_3\text{O}_4$.

FERRIDCYAN'OGEN is a compound organic radical which has not been isolated, but which forms with potassium a well-known compound used in the arts, called the ferridecyanide of potassium or red prussiate of potash. In the preparation of this salt, a solution of ferrocyanide of potassium is acted on by a stream of chlorine gas until the color of the liquid passes from yellow to deep red, and thereafter, on evaporation and cooling, fine red crystals are obtained. The chlorine, Cl , acts upon one equivalent of the ferrocyanide of potassium, $\text{K}_3\text{Fe}_2(\text{C}_5\text{N}_3)_4$, removing two equivalents of potassium, 2K , forming chloride of potassium, 2KCl , whilst the remaining constituents combine together, and produce one equivalent of ferridecyanide of potassium, $\text{K}_3\text{Fe}_2(\text{C}_5\text{N}_3)_4$. The latter is known commercially in red crystals, readily soluble in water, and yields a fine deep *Prussian blue* (Turnbull's blue) when mingled with solution of protosulphate of iron (green vitriol), and hence is used largely in dyeing and calico-printing.

FERRIER, DAVID, neurologist, was born at Aberdeen, Scotland, in 1843, and educated in the university there. He went to Heidelberg in 1854, devoting his attention to the study of psychology, physiology, anatomy and chemistry. He was a professor of forensic medicine in King's College, from 1872 to 1889. He became a doctor of medicine in 1876, and he was physician in the Hospital for Epilepsy and Paralysis, Regent's Park, 1877-80. He was also physician to the National Hospital for the Paralyzed and Epileptic. He has published *The Functions of the Brain* (1894); *The Localization of Cerebral Disease* (1878); was also a founder and an editor of *Brain, a Journal of Neurology*.

FERRIER, JAMES FREDERICK, LL.D., a metaphysician, was b. in Edinburgh, Nov., 1808. After studying at Oxford, where he took the degree of B.A. in 1832, he was admitted to the Scottish bar in 1833. In 1842 he was elected to the chair of history in the university of Edinburgh, and in 1845 to that of moral philosophy in the university of St. Andrews. Mr. F. early attracted notice by some metaphysical essays, which appeared in *Blackwood's Magazine*; and in 1854 he published the *Institutes of Metaphysics*, in which he endeavors to construct a system of idealism in a series of propositions, demonstrated after the manner of Euclid. He afterwards edited the collected works of his father-in-law, the late Prof. John Wilson, of the university of Edinburgh. F. died at St. Andrews, June 11, 1864.

FERRIER, SUSAN EDMONSTON, aunt of the above, a successful novelist, was b. in Edinburgh in 1782, and d. in 1854. Her first work, *Marriage*, appeared in 1818, and this was followed by *The Inheritance* (1824) and *Destiny* (1831). The merit of these tales, which are characterized by genial wit, a quick sense of the ludicrous, and considerable ability in the delineation of national peculiarities, is sufficiently proved by the fact that they have stood their ground, notwithstanding the enormous number of works of fiction which have flowed from the press since their publication.

FERRO, or **HIERRO**, the most western of the Canary isles, was formerly considered the most westerly point of the old world, and for this reason geographers at one time took it as the point of departure in reckoning longitudes, as is still done by the Germans and others. Hence, in all probability, originated the present hemispherical division of the maps of the world, F. being taken as the boundary-line. The English, however, have adopted the meridian of Greenwich as the first meridian, and in this their example is followed by the Dutch, and in sea-charts generally; pop. '87, 5892. The meridian of F. is $18^\circ 9'$ w. of that of Greenwich. See LATITUDE.

FERROCYAN'OGEN is a compound organic radical, generally regarded by chemists as existing in ferrocyanide of potassium, or the yellow prussiate of potash, but which has not yet been obtained in a separate state. The principal compound of F. is the ferrocyanide of potassium, which is prepared by heating to redness in a covered iron pot a mixture of 3 parts by weight of nitrogenized matter, such as dried blood, hoofs, parings of hides, scrapings of horn, or the flesh of old or diseased horses and other animals, 3 parts of carbonate of potash, and 1 part of iron filings. The carbon, nitrogen, and iron combine together to produce ferrous cyanide, $\text{Fe}(\text{CN})_2$, which unites with the potassium cyanide, KCN , formed at the same time, the result being ferrocyanide of potassium, $\text{K}_3\text{Fe}_2(\text{C}_5\text{N}_3)_4$, or $2\text{K}_4\text{FeCy}_6$. The compound which is obtained from the heated iron vessel is impure, but by repeated solutions in hot water, and recrystallization on cooling, the salt is obtained pure in fine large tabular crystals of a lemon-yellow color. The ferrocyanide of potassium is largely used in dyeing and calico-printing (q.v.), in the production of many shades of *Prussian blue*; and when it is treated with dilute sulphuric acid, and heat is applied, hydrocyanic or prussic acid, HCN or HCy , distills off from the mixture. The ferrocyanide of potassium is characterized by giving no indication of the presence of iron in its radical on the application of any of the tests for iron. It gives a light-blue precipitate on the addition of a solution of pro-

tosulphate of iron; a dark-blue precipitate with perchloride of iron; a ruddy brown precipitate with sulphate of copper; and a white precipitate with acetate of lead.

FERROL, a strongly fortified seaport of Spain, in Galicia, is most advantageously situated on a narrow arm of the sea, 14 m. n.e. of the town of Corunna. It was originally a fishing-town, until selected for its natural advantages as a seaport by Charles III., who erected here what was at one time the finest naval arsenal in the world, and destined it exclusively for the Spanish royal navy. The entrance to the harbor, formed by a narrow inlet from the bay of Betanzos, admits of the approach of only one ship-of-the-line at a time, and is defended by the castles of San Felipe and Palma. The town is defended by walls and fortifications, is, on the whole, regularly built, and has several squares and pleasing alamedas or public walks. The arsenal, in which fifteen ships-of-the-line could be simultaneously built, covers a great space; and though now in a somewhat ruinous condition, is still the most important in Spain. F. has manufactures of hats, naval stores, hardwares; and exports corn, brandy, vinegar, and fish. Pop. '87, 25,701.

FERROTYPE, a term applied by Mr. Robert Hunt, the discoverer, to designate some photographic processes, in which salts of iron play an important part. Like many of the earlier paper processes, the F. is far inferior in sensibility to the more modern collodion process or Archetype, and is on that account seldom if ever used even for landscapes.

FERRUGINOUS is a term employed in chemistry to denote the presence of iron in natural waters, minerals, etc. It is synonymous with the term chalybeate. See CHALYBEATE WATERS.

FERRY (from Sax. *faran*, Ger. *Fahren*, to move, proceed, allied to the Lat. *fero*, Eng. *bear*), a passage by boat across water. By the law of England, a man may have a right to keep a boat and to ferry passengers for a consideration, just as he may have a right to hold a fair, either by royal grant, or by prescription, from which a royal grant at some previous time will be presumed.

Common rowing-boats are generally used for ferrying foot-passengers, but when horses and carriages have to be taken across, a flat-bottomed barge, with an inclined plane at one end, to rest upon the shore, for landing and embarking, is generally used. This is either rowed across or pulled by a rope. When the current is strong, and the river of moderate width, the latter is best. The rope stretched across the river passes through rings or over pulleys attached to the barge, and the ferrymen move the barge across by pulling the rope. The chief advantage of the rope is to restrain the barge from drifting in the direction of the stream. With a small boat, this is obviated by the ferryman rowing obliquely, as though he were steering for a point higher up the river; thus he moves through the water upwards to the same extent that the water moves over the land downwards; and by a composition of these motions, and his tending to the other side, is carried directly across. Broad estuaries are now traversed in many places by steam-ferry.

Rafts are sometimes used for ferrying. On the Nile, a sort of raft is made of inverted earthen-pots full of air. For further information on the crossing of rivers, see FORD, FORDING.

Flying-bridge is the name given to a kind of ferry-boat which is moved across a river by the action of the combined forces of the stream and the resistance of a long rope or chain made fast to a fixed buoy in the middle of the river. The boat thus attached is made to take an oblique position by means of the rudder; the stream then acting against the side, tends to move it in a direction at right angles to its length, while the rope exerts a force in the direction towards the buoy. If these two forces be represented by the sides of a parallelogram, the actual course of the boat would be in the direction of the diagonal (see COMPOSITION AND RESOLUTION OF FORCES); but as the length of the rope remains the same, the boat must continue always at the same distance from the buoy, and therefore its course is a curve, a portion of a circle, of which the buoy is the center, and the rope the radius. The course of the boat and the action of the two forces are strictly analogous to the path of a rising kite, and to the forces of which this path is the resultant. The holder of the kite corresponds to the buoy, the wind to the tidal stream, and the tail to the rudder. Flying-bridges are used for military purposes, and the modes of adapting them to the varying circumstances of the width of rivers and the velocity of their currents, forms a part of the study of military engineering. An important element in the problem, is the determination of the right point of attachment for the rope. In the case of a wide river, the rope or chain requires to be of considerable length, and must be supported by movable buoys or by small boats.

A ferry in the United States is usually an important and valuable property, owned or assumed by the local governments, and regulated by laws. The city of New York holds the right to control ferries from the English colonial charter, and no ferry can be started to or from the island on which the city stands without consent of the corporation. But usually one state has the right to establish a ferry over a navigable river separating it from another state, although its jurisdiction may not extend beyond the middle of the stream. In the case of New York city, the corporate rights extend to low-water mark on the opposite shores, and therefore the city practically controls all ferries. Ferry franchises are commonly protected by their express terms from infringe-

ment or rivalry. The franchise of a ferry is an incorporate hereditament, is subject to dower, may descend to heirs, may be leased, sold, and assigned; but inasmuch as the people have an interest in it, it is subject to legislative regulations for the protection and enforcement of public rights. Controllers of ferries and carriers are subject to all laws affecting such public servants, with respect not only to care of property, but also to safety of life. Tenants or lessees of ferries are owners in law in case of injury.

FERRY, JULES FRANÇOIS CAMILLE: b. Saint Dié, Vosges, France, 1832, April 5. He was admitted to the bar in Paris, 1844, joined the group of young lawyers who earnestly opposed the empire, and was among the famous "thirteen" condemned to imprisonment in 1864. He became a writer on the *Temps*, 1865, where his brilliant and sarcastic political articles attracted much attention. In 1869 he was elected to the *Corps Législatif*, taking his seat among the members of the "left." He voted against the declaration of war with Prussia, and after the fall of Sedan, he and the other Paris deputies were proclaimed members of the government of the national defense, 1870, Sept. 4. During the communal insurrection he distinguished himself by his bravery, and it was mainly through his efforts that the rioters were subdued. Being elected one of the representatives of the department of the Vosges he resigned his place in the government, 1871, Feb. 8. When Grévy became pres. of the republic, 1879, F. was appointed premier and minister of public instruction and fine arts, in which position he manifested bitter hostility to the Jesuit order, and was largely instrumental in securing their banishment from France. On Nov. 10, 1881, the ministry of which F. was a member resigned on account of the attacks made on its policy towards Tunis. After the death of Gambetta, F. was again appointed premier, Feb. 1883, but he again resigned, with his whole cabinet, 1885, March 30, in consequence of an adverse vote in the chamber of deputies which followed the reception of the news of the disaster to the French arms at Langson on the Chinese frontier. In March, 1893, he was elected President of the Senate, but died suddenly a few days later.

FERRY, THOMAS WHITE, b. Mich., 1827; was a member of the Mich. legislature, 1850; and of the state senate, 1856; was elected as a Republican to the XXXIXth and three succeeding congresses. He was elected to the U. S. senate, 1870; and was re-elected, 1876. He was chosen pres. *pro tem.* of the senate, 1875, and on the death of Vice-pres. Wilson in that year he became acting vice-president of the United States. He d. in 1896.

FERSEN, AXEL, Count, 1755-1810; marshal of Sweden, son of count Axel, a state senator; educated by his father, and in the Turin military academy. He was aide to Rochambeau in the American revolution, and was present at the surrender of Yorktown. Returning to France at the time of the French revolution, he became a warm friend of the royal family. When they fled from Paris he disguised himself and acted as their coachman, conducting them as far as Bondi, whence they were sent on under other care. After the failure of the scheme and the imprisonment of the royal family, he exerted himself in every way for their comfort. After their execution he returned to Sweden, and became chancellor of Upsala university. Not long after, he was plenipotentiary to the Rastadt congress. When the crown-prince of Sweden suddenly died in June, 1810, Fersen and his sister were suspected of procuring his death by poison. At the funeral they were attacked by the mob, and he was slain, the sister escaping.

FERTILIZATION OF PLANTS. See **FECUNDATION**.

FERTILIZERS. See **GUANO**; **MANURE**; **PHOSPHATES**.

FESA, or **FASA**, a small town of Persia, in the province of Fars, 83 m. s.e. of Shiraz, is situated in a mountain defile. It has manufactures of silken, woolen, and cotton fabrics, and some trade.

FESCENNINE VERSES, a branch of the indigenous poetry of ancient Italy, were a sort of dialogues in rude extempore verses, generally in Saturnine measure, in which the parties rallied and ridiculed one another. It formed a favorite amusement of the country-people on festive occasions, especially at the conclusion of harvest and at weddings. As was to be expected, it often degenerated into licentiousness, that at last required the curb of the law. The F. V. are usually considered to be of Etruscan origin, and to have derived their name from the Etrurian town Fescennium; but there is little probability in this etymology. Verses of this sort were and are popular to this day all over Italy. The name is more likely connected with *fascinum*, fascination, enchantment, or the evil eye, against which the chanting of verses may have originally been intended as a protection.

FESCH, JOSEPH, Cardinal and archbishop of Lyons, was b. 3d Jan., 1763, at Ajaccio. His father, a Swiss officer in the service of Genoa, had married a widow, whose daughter by a former husband, Letizia or Lætitia Ramolino, became the mother of Napoleon Bonaparte. F. was thus the half-brother of Letizia, and the uncle of the future emperor. He had entered the clerical profession, but left it at the outbreak of the French revolution, and, in 1795, became commissary to the army of the Alps under his nephew in Italy. The first consul having resolved on the restoration of the Catholic worship, F. resumed the clerical habit, and was active in bringing about the concordat with Pope Pius VII. in 1801. He was now (1802) raised to be archbishop of Lyons, and in the following year to be cardinal. In 1804, he was sent as French ambassador to Rome,

where he ingratiated himself with the pope by his adroit management and ultramontane sentiments, and contributed to induce the pope to undertake his mission to Paris to consecrate Napoleon as emperor. F. accompanied the pope, and assisted at the coronation; and for his services at Rome, he was rewarded by the office of grand almoner and a seat in the senate. In 1806, the archbishop of Regensburg, arch-chancellor and first prince elector of the just expiring German empire, and about to become the prince primate of the nascent confederation of the Rhine, chose F. to be his coadjutor and successor; and, along with all these dignities, he received a stipend of 150,000 florins a year. In 1809, Napoleon wished to invest him with the archbishopric of Paris, but F. declined it, as he had long been dissatisfied with the emperor's policy in regard to the papal chair. In 1810, he presided at a national conference of clergy assembled at Paris, and the views which he maintained there, with even more than usual keenness, brought him into disgrace with the emperor, who was still further exasperated against him on account of a letter which F. wrote to the pope, then (1812) in captivity at Fontainebleau, and which was intercepted. He lost his imperial dignities and pension, and the prospects of the primacy of the Rhine confederation were also taken away by the appointment of Prince Eugene to be grand duke of Frankfort. After this, F. lived in a sort of banishment at his bishopric of Lyons. At the approach of the Austrians in 1814, he fled to Rome with his sister Letizia, the mother of the emperor, where he was received with open arms by the pope. The return of Napoleon brought him back to France, and during the hundred days, he was nominated a member of the chamber of peers, though he never took his seat; but, after the battle of Waterloo, he had again to take refuge in Italy. The royalist clergy now persecuted him with accusations and lampoons which he in no way deserved. His resistance to the will of his nephew, and indeed his whole conduct, seem to have been actuated by sincere zeal for what he considered to be the interests of the church. When called upon by the Bourbons to resign his episcopal office, he obstinately refused; and it was not till 1825, after receiving a papal brief interdicting the exercise of his clerical functions, that he resigned the charge, but not the title. In 1837, an attempt was made to reinstate him, to which, however, the French government refused assent. He lived in the greatest friendship with his sister, Madame Mère, as she was styled, till his death. He died 13th May, 1839. Of his famous and very large collection of paintings, he bequeathed a part to the city of Lyons, and the rest was disposed of in a series of auctions at Rome after his death.

FESCUE, *Festuca*, a genus of grasses, very nearly allied to brome-grass (q.v.), and having in some species a loose, in some a contracted panicle; the spikelets many-flowered, with two unequal glumes, which they much exceed in length; each floret having two lanceolate paleæ, the outer palea rounded at the back, and acuminate or awned at the summit; the stigmas growing from the apex of the germen. The species are numerous, and are very widely diffused over the world, both in the northern and southern hemispheres. Among them are many of the most valuable pasture and fodder grasses. None are more valuable than some of the British species.—**MEADOW F.** (*F. pratensis*), a species with spreading panicle and linear spikelets, from 2 to 3 ft. high, common in most meadows and pastures of rich soil, in Britain and throughout Europe, in northern Asia, and in some parts of North America, is perhaps excelled by no meadow or pasture grass whatever. It is suitable both for alternate husbandry and for permanent pasture.—**SPIKED F.** (*F. loliacea*)—by many botanists regarded as a variety of meadow F., although it departs from the habit of the genus in having the branches of the panicle reduced to a single spikelet, and forming a two-rowed raceme or spike—is regarded as an excellent grass for rich moist meadows.—**HARD F.** (*F. duriuscula*), a grass from one foot and a half to 2 ft. high, with a somewhat contracted panicle, mostly on one side, is one of the best grasses for lawns and sheep-pastures, particularly on dry or sandy soils. Several varieties are known to seedsmen and farmers.—**CREeping F.** or **RED F.** (*F. rubra*) is probably a mere variety of hard F., being distinguished chiefly by its extensively creeping root, which particularly adapt it to sandy pastures, and to places liable to occasional inundations.—**SHEEP'S F.** (*F. ovina*) is a smaller grass than any of these, not generally exceeding a foot in height, and often much less, abundant in mountainous pastures, and especially suitable for such situations, in which it often forms a principal part of the food of sheep for many months of the year. It is common in all the mountainous parts of Europe, and in the Himalaya; it is also a native of North America, and species very similar, if not mere varieties, abound in the southern hemisphere. Its habit of growth is much tufted.—**TALL F.** (*F. elatior*) is a grass of very different appearance, 4 or 5 ft. high, with spreading much branched panicle, growing chiefly near rivers and in moist low grounds, and yielding a great quantity of coarse herbage, which, however, is relished by cattle.—Of foreign species, which have been introduced into Britain, *F. heterophylla* best deserves notice, a tall species with narrow root-leaves, and broad leaves on the culm; a native of France and other parts of the continent of Europe, and pretty extensively cultivated in some countries, particularly the Netherlands.—All these species are perennial.—Some small annual species occasionally form a considerable part of the pasture in dry sandy soils, but are never sown by the farmer.—A Peruvian species (*F. quadridentata*), called *pigouil* in its native country, and there used for thatch, is said to be poisonous to cattle.

FESS. The F. in heraldry consists of lines drawn horizontally across the shield, and containing the third part of it, between the honor point and the nœmbril. It is one of the honorable ordinaries, and is supposed to represent the waist-belt or girdle of honor, which was one of the insignia of knighthood.

PER FESS.—A shield, or charge in a shield, is said to be *party per fess*, when it is horizontally divided through the middle, or, as the French say, simply *coupé*.

FESSWISE is said of a charge placed *in F.*; that is to say, horizontally across the shield.

FESSENDEN, FRANCIS, b. Maine, 1839; graduated at Bowdoin, and studied law. In 1861, he was appointed capt. of infantry; was wounded at Shiloh, became col. of volunteers, and commanded a brigade at Chantilly, and at other places. He was brevetted major-general in 1865, and was retired in 1866.

FESSENDEN, THOMAS GREEN, 1771-1887; b. N. H.; graduated at Dartmouth in 1796; studied law, and occupied his leisure hours in writing humorous and sarcastic verses for a newspaper edited by Joseph Dennie. In 1803, he published in London, anonymously, *Terrible Tractoration*, a satire upon the medical profession, and especially upon the then famous metallic tractors of Dr. Perkins. The work was enlarged, and reached a third edition. In 1822, he started the *New England Farmer*, with which he was connected until his death. Among his works are *Democracy Unveiled*; *American Clerks' Companion*; *The Ladies' Monitor*; *Laws of Patents for New Inventions*. For two years he edited the *Weekly Inspector* in New York city.

FESSENDEN, WILLIAM PITT, LL.D., 1806-69; b. N. H.; graduated at Bowdoin in 1823; admitted to the bar in 1827, and soon afterward made his home in Portland, Me. He was a member of the state legislature in 1832; of congress in 1841; and of the U. S. senate in 1853. Being rechosen in 1859, he was appointed chairman of the finance committee, and throughout the war of the rebellion rendered valuable service by aiding the secretary of the treasury to maintain the national credit, as well as by his counsel in the senate chamber. In 1864, on the retirement of Mr. Chase from the secretaryship of the treasury, he accepted that portfolio, and discharged the duties of the office during a most critical period of the nation's finances, until Mar., 1865, when, owing to failing health, he resigned, and resumed his seat in the senate, to which he had been re-elected. He began his career as an ardent whig; was a member of the whig national conventions of 1840 and 1848, in the latter advocating the nomination of Webster; but in the convention of 1852, he opposed Webster, and favored Scott. He was one of the founders of the republican party, in which he became a prominent leader.

FESSLER, IGNAZ. AURELIUS, a celebrated Hungarian historian, was b. in 1756, in the co. of Soprony or Oedenburg. During a long life full of adventures, F. served successively the emperor Joseph II., the king of Prussia, and the emperor of Russia; and also held the office of professor of oriental languages at different universities. He died at St. Petersburg, 15th Dec., 1839. Among his works of a lasting value are *Attila* (Breslau, 1794), *Mathias Corvinus* (2 vols. 1793; 2d edition, 1806, Breslau), and the *History of the Hungarians, etc.* (*Geschichte der Ungarn und deren Landsassen*, 10 vols. Leip. 1812-25). His autobiography, entitled *Recollections of my 70 Years' Pilgrimage* (*Rückblicke auf meine 70 jährige Pilgerschaft*, Breslau, 1826; 2d edit. Leip. 1851), is also a very interesting work. Deep learning, coupled with a rare beauty of style, render F.'s works (all written in German) attractive in the highest degree.

FESTIVAL PLAYS. See MYSTERIES.

FESTIVALS, or FEASTS (Lat. *festum*, probably from the same root as *fast* (q.v.); according to some, from Gr. *hestia*, hearth), a term denoting certain periodically recurring days and seasons set aside by a community for rest from the ordinary labor of life, and more or less hallowed by religious solemnities. Originating within the narrow circle of the family, and commemorating momentous events affecting one member or all, these pauses became more frequent, and of wider scope, as the house gradually expanded into a tribe, a people, a state. The real or imaginary founders, legislators, heroes, became objects of veneration and deification, and the salient epochs of their lives the consecrated epochs of the year. National calamities or triumphs were, in the absence of annals, best remembered by corresponding general days of humiliation or exultation. Earliest of all, however, did the marked stages in the onward march of nature; spring and autumn, seed-time and harvest-time—symbols of life and death; the solstices—turning-points of summer and winter; the new moon and the full moon; the termination of cycles of moons and cycles of years, present themselves as opportune halting-places for man himself. No less were the all-important periodical rises of fertilizing rivers, and the anniversaries of importations and inventions of new implements for the better cultivation of the soil, or tending of the flocks, befittingly celebrated. The inherent human tendency towards referring all things of graver import, life and death, abundance and want, victory and defeat, to a higher power, could not but infuse a religious feeling into epochs so marked. Fostered and guided by priests and lawgivers, this property of our nature ere long found its expression in common sacrifices, prayers, and ceremonies, consecrated to the various superior and minor deities who presided over

and inhabited the elements of the visible and invisible creation, and who, working all the changes within them, acted, each in his sphere, as a partial providence over man. According to the event which called them forth, these F. were mournful or joyous, jubilant or expiatory. Even when sorrow was to be expressed, the mortification of the body did not always suffice, but plays, songs, dances, and processions full of boisterous mirth, were resorted to—as in the F. of Isis at Busiris, of Mars at Papremis, in the Adonia of Egypt, Phenicia, and Greece—because the divine wrath or sorrow was, like that of man, to be changed into satisfaction. Besides the relation between the common-tutelar deity and those he protected, the bond also by which the otherwise disconnected members of the body-politic were held together was, by means of these festive gatherings, periodically brought in view, and invested with greater strength and importance. Apart, however, from this their historical, astronomical, religious, and political end, F. served another purpose—that of growing civilization. It was the glowing spirit of emulation which, stimulating the gifted in mind and body to strive for the festive laurel in contests of genius and skill, in honor of the gods, and in the face of all the people, matured all that was noble and brilliant within the community. Archaic rudeness and rustic extravagance became refined grace and classic harmony. The stirring drama, the glorious anthem, the melodious dance, the elegant game, which accompanied the festive sacrifice of some nations at their highest stage of development, had arisen out of those very mimicries and shouts, rude and savage beyond expression, of generations not long before them. Enthusiastic, wild, metaphysical Egypt invested the countless days consecrated to her deified stars, plants, animals, and ideas; to the Nile, to Ammon, Kneph, Menes, Osiris; to Horus, to Neitha, to Ptah, with a mystery, sensuality, and mournfulness always exaggerated, sometimes monstrous. The Hindu, no longer daring to offer human sacrifices, shows his odd and cruel materialism by throwing into the waves, on his festival of rivers, some of his costliest goods, gold, jewels, garments, and instruments; while in the licentiousness and debaucheries perpetrated on the festival of Shiva, the god of procreation, or on the Bacchantics of the goddess Bhavani, he exceeds even those of the Egyptians on their Neitha feasts at Bubastis, and the Greek worship of Venus in her Cyprian groves. Phenicians and Assyrians, Babylonians and Phrygians, according to the little we know of their religions and manners, appear to have feasted, thanked, propitiated, mourned all at different times, and in the way most befitting their several natures, even in the case of those gods and F. which they had in common.

The ancient Persians alone of all nations had no F., as they had no temples and no common worship. These “Puritans of Polytheism,” who worshiped the sun only, and his representative on earth, fire, scorned show and pomp, and large religious gatherings. A striking contrast to them is formed, in another hemisphere, by the ancient Mexicans, who were found to possess one of the most richly developed calendars of F., scientifically divided into movable and immovable feasts. As a strange and singular phenomenon among F., we may also mention here that “of the Dead or Souls,” celebrated among the wild tribes of North America. At a certain time, all the graves are emptied, and the remains of the bodies buried since the last festival are taken out by the relatives, and thrown together into a large common mound, amid great rejoicings and solemnities, to which all the neighboring tribes are invited.

Greece had received the types of civilization, religion, and art from Egypt and the east generally, but she developed them all in a manner befitting her glorious clime and the joyous genius of her sons. At the time of the *Iliad*, two principal festivals only—the harvest and the vintage—seem to have been celebrated (ix. 250); but they increased with such rapidity, that in the days of Pericles they had reached the number of a thousand; some indeed being an epitome only of their memorable feats of arms, others restricted to one town, or province, or profession, or sex, or to a few initiated, or recurring only at intervals of several years; but there were still so many kept by the whole people that ancient writers bitterly denounce them as merry beginnings of a sad end, as the slow but sure ruin of the commonwealth. Their forebodings proved true enough; and yet Greece would certainly never have reached the highest place among nations, as far as literature, the arts, and philosophy are concerned, had it not been for the constant contests attached to her many festivals. She resisted Asia, because her citizens were always alert, always ready. The religious part of the festival—homage offered to personified ideas—consisted mostly in the carrying about of the deity of the day to the sound of flute, lyre, and hymns, and in a sacrifice, followed by a general meal upon certain portions of the animal offered. Then followed scenic representations symbolizing the deeds of the gods; after which came games and matches of all kinds—foot, horse, and chariot races, leaping, boxing, throwing, wrestling, etc. Separate accounts are given of some of the more remarkable Greek festivals. See BACCHUS; ELEUSINTIAN MYSTERIES; PANATHENÆA, etc. There were also special times set aside for the “holy games” proper. The most important of these were the Olympian, the Pythian, the Nemean, and the Isthmian. (See ISTHMUS; NEMEA; OLYMPIA; OLYMPEAD; OLYMPIC GAMES; PYTHIAN GAMES.) As all these festivities were provided out of the public purse—from the confiscated estates of the “tyrants” and political delinquents—the individual did not suffer more than a welcome interruption of his usual business, and under that genial sky the penalty to be paid for occasional indolence was not too heavy.

Rome, founded amid pastoral festivities in honor of some god Pales, adopted and acclimatized, as she went on from conquest to conquest, the foreign deities, exactly as, with her usual prudence and practical sense, she conferred her right of citizenship on her foreign inhabitants, and on whole nations subjected to her rule. Her yoke was thus less galling to the new provinces, while at the same time the populace at home found sufficient distraction in the many ancient and newly imported F., with their quaint rites and gorgeous pageantry. Yet the Romans—more parsimonious and abstract by nature than the vivacious Greek neighbors from whom they had accepted the greatest part of their religion—never exceeded in their F. the number of one hundred, and in these, again, a distinct line was drawn between civil and religious ones. Some of the principal religious F. were the Sementinæ, on the 25th of Jan.—the rural festival of the seed-time; the Lupercalia, in honor of Pan; the Cerealia; the night festival of the Bona Dea; Matronalia; Minervalia, etc. To the purely civil ones belong the Janualia, the 1st of Jan. and the new-year's day, when the new consuls entered upon their office, and friends used to send presents (*strenæ*) to each other; the Quirinalia, in memory of Romulus, deified under the name of Quirinus; and the Saturnalia, in remembrance of the golden age of Saturn, beginning on the 19th of Dec. The celebration of these F. was in all respects imitated from the Greeks, with this difference only, that the games connected with them became, with the pre-eminently bellicose Romans, terribly life-like images of war. Their sham sea-fights; their pitched battles between horse and foot, between wild beasts and men; their so-called Trojan games, executed by the flower of the nobility; their boxing-matches (with gloves that had lead and iron sewed into them); circus, arena, and amphitheater gave, especially in later times, the greater satisfaction the greater the number of victims.

It is one thing only that monotheism has in common with polytheism with respect to its F.—namely, that they are with each the religious expression of human joy or human sorrow. But if the former, with a dim misgiving of some awful and supreme power, invited the multifarious governors of the many provinces of nature to partake, as guests, of bodily and intellectual feasts, *together* with their hosts; monotheism, in binding up all fear and all hope, all gratitude and all awe, which moved the heart of man, in one almighty Creator, Mover, and Maintainer of all things, celebrated its F. in honor of this omnipresent Spirit with a veneration, a purity, and a lofty elevation, such as the worshippers of star, animal, or image never knew. With the first and strictest monotheists, the Hebrews, whose very existence as a nation was traced to the special and miraculous interference of this highest and only God, the remembrance of that great event, their liberation from Egypt, and the momentous period of preparation in the desert which followed it, mingled with almost all their religious observances, and especially their F., and infused into them all a tone of deep and fervent gratitude; while at the same time it held ever before their eyes the cause of their nationality, and their aim and destiny “to be a kingdom of priests and a holy people.” The Hebrew F., too, are of a historical, agricultural, astronomical, and political nature; but they mostly combine all these characteristics, and are always hallowed by the same religious idea, and the same piety and devotion to one and the same holy name. Connected with their F. were no plays and no representations of a god's deeds, no games and no cruelty, no mystery and no sensuality, but the sacrifice of the day, and a special occupation with the divine law, were the visible signs of the exalted seasons. The influence of the number seven—an influence met with among most eastern nations—is seen in the recurrence of many of the Jewish solemnities. See SEVEN. The Sabbath, the first and most important of these septenary festivals, is treated of under its own head. Concerning the service in the temple, and the way in which this and the other F. were and are kept after the destruction of the temple, see HEBREW MUSIC; JEWS. The most exalted of new-moon F. was that of the first day of the seventh month, “the day of remembrance of the sounding,” or “of trumpets” (Lev. xxiii. 24), to which, in later times, when the Seleucidan era was introduced (the Syrian year beginning with the autumnal equinox), the name of Rosh hashana (New Year) was given; notwithstanding that in Exodus (xii. 2) Nisan is spoken of as the first month of the year. After a period of six years of labor, the earth, too, was to celebrate a Sabbath-year; what it produced spontaneously belonged to the poor, the stranger, and to animals. It is remarkable that even Alexander the great and Cæsar remitted the taxes of Judea in this year of *Shemitta* (abandoning). After a revolution of seven times seven years, the year of Jubilee, or *Jobel*, was to be celebrated, in which all the Hebrew slaves were set free, and all land which had been sold in the interval was restored to the former owners, in order that the original equilibrium in the families and tribes should be maintained intact. (These two F., however, were, according to the Talmud, not kept before the Babylonian captivity.) The preeminently agronomical and historical F. were the three *Chaggim* (whence the Arab. *Hagg*, a pilgrim to Mecca)—viz., Pesach (Passover), Schabuoth (Feast of Weeks), and Succoth (Feast of Tabernacles), on which three every male was obliged to go up to Jerusalem and offer some of the first fruits, besides the prescribed sacrifices (see PASSOVER, etc.).

The postmosaic and exclusively historical F., Purim, the feast of Haman, Chenuca, the feast of the Maccabees, will be noticed in the article on JEWS.

Only a cursory glance can be here taken of the Christian F., which are treated fully

and separately under their various names. They were for the most part grafted, in the course of time, upon the Jewish and pagan ones, but always with a distinct reference to Christ and other holy personages. The weekly day of rest was transferred from Saturday to Sunday, and called the Day of Joy, or Resurrection, just as the weekly Jewish fast of Monday and Thursday were changed for Wednesday and Friday. See FASTS. For a long time, both Saturday and Sunday were celebrated, especially in the east. Two separate celebrations took the place of the Jewish Passover: the *Pascha Staurosimo*n was the festival of the death, the *Pascha Anastasimo*n of the resurrection of our Lord (see EASTER); and the festival of Pentecost, or the law-giving at Sinai, became the festival of the outpouring of the Holy Ghost, and of the inauguration of the New Covenant.

In the course of the 4th c., two new F. were introduced: Epiphany (q.v.), which originated in the east; and that of the Nativity or Christmas (q.v.). Circumcision, Corpus Domini, the F. of the Cross, of Transfiguration, of the Trinity, and many others, are of still later date. The veneration felt for Mary as the "mother of God," found its expression likewise in the consecration of many days to her special service and worship; such as that of her presentation, annunciation (Lady's Day), assumption, visitation, immaculate conception (q.v.), and many minor F., over and above the Saturdays, which, in some parts, were entirely dedicated to her, in order that the mother might have her weekly day like the Son. Besides these, there were F. of angels, of apostles, saints, martyrs (on the supposed anniversary of their death, called their birthday, *dies natalis*), of souls, ordinations, etc.

Celebrated at first with all the primitive simplicity of genuine piety, most of these F. were ere long invested with such pomp and splendor that they surpassed those of the ancient Greeks and Romans. Burlesque, even coarse and profane representations, processions, mysteries, and night-services, were, in some places, although unauthorized by the general church, connected with them, and voices within the church loudly denounced these "pagan practices." Ordinances forbidding mundane music and female singers for divine service were issued, the vigils were transformed into fasts, days of abstinence and penance were instituted, partly as counterpoises, but with little result. Nor did the prodigious increase of these festive occasions, and the rigor with which abstinence from labor was enforced in most cases, fail to produce the natural results of indolence and licentiousness among the large mass of the people. Bitter and frequent were the complaints throughout Christendom; but although even men like archbishop Simon of Canterbury (1332), Petrus de Alliaco, Nicolaus of Clemangis, did their utmost to obtain a reduction of these festive occasions, which overspread well-nigh the whole year, it was only after the most decided and threatening demands, such as that pronounced by the German diet of Nürnberg in 1522, that Pope Urban was prevailed upon to reduce the number for Catholic Christianity (1642). Benedict XIV. (1742), Clement XIV. (1773), followed in the same direction. On the change produced both in their number and in the manner of their celebration through the reformation, we must forbear to enlarge here.

The Christian F. have been divided variously: into *feriæ statutz* (returning annually at fixed times), *indictæ* (extraordinary, specially proclaimed), *duplicia* (double reminiscence, or of higher importance), *semiduplicia* (half double), etc. Another division is into weekly and yearly feasts, these latter being subdivided into greater and minor, or into movable and immovable. There is also a distinction made between *integri* (whole days), *intercisi* (half-days), etc.

The only trace of the ancient manner of dating a festival from the eve or vesper of the previous day—a practice discontinued since the 12th c., when the old Roman way of counting the day from midnight to midnight was reintroduced—survives in the "ringing in" of certain days of special solemnity on the night before, and in the fasts of the vigils.

On some of the principal Mohammedan F., partly based upon those of the Jews and Christians, such as the weekly Friday, the Yom Ashoorá (the Jewish day of atonement), the birthday of the prophet (Molid An-Nebee), that of Hussein, of Mohammed's granddaughter Zeyneb, of the night of the prophet's ascension to heaven (Leylet Al-Mearag), the night of the middle of the month Shaabán, in which the fate of every man is confirmed for the ensuing year; the Eed Al-Shagheer or Ramadan-Beyram, at the end of the Ramadan fasts, and the Eed Al-Kabir, or the great festival of the sacrifice (Kurban Beyram), see MOHAMMEDANISM. For further information, see Herodotus (ii. 60); Plutarch (vii.); Strabo (vi. and x); Ovid, *Fasti*; Macrobius, *Sat. i. 7, 11*; Meursius, *Græcia Feriata*; Meiners, *Geschichte d. Relig.*; Fasold, *Ierologia*; Bible; Mishna; Gemara; Shulchan Aruch; Josephus; Philo; Maimonides; Buxtorf, *Lex. Talm.*; *Synag. Jud.*; Bartolucci, *Bibl. Rabb.*; Lightfoot, *Hor. Hebr. and Talm.*; Lund, *Bibl. Hebr.*; Wette, *Archæologie*; Neander, *Hist. of the Ch.*; Blackmore, *Christ. Antiq.*; Baumgarten, *Erläuterung d. chr. Alterth.*; Siegel, *Handb. d. chr. Alterth.*; Mai, *Discorsi di Argomento Religioso*; Koran, etc.

FESTOON, in architecture, a sculptured wreath of flowers or fruit, frequently used as an ornament in Roman and renaissance buildings. Like many of the other ornaments of classic architecture, it owes its origin to one of the sacrificial emblems, viz.,

the flowers with which the heads of the animals, the altars, etc., used to be decorated. The F. occurs along with bulls' heads on the frieze of the temple of Vesta at Tivoli.

FESTUS PORTIUS, successor of Felix as procurator of Judea; sent there by Nero about 60 A.D. It was he who heard the case of the apostle Paul, whom Felix had left prisoner, and but for the fact that Paul had already appealed to Rome he would have set the apostle free. He had some difficulties with the Jews, but none of great importance. Josephus gives him the character of a just and vigilant magistrate.

FESTUS, **SEXTUS POMPEIUS**, a Latin lexicographer of the 3d or 4th c. of our era, is one of the most important ancient authorities we have on the Latin language. He made an epitome of the great work of Verrius Flaccus, *De Verborum Significatione*. This compilation, which was arranged alphabetically in 20 books, was still further abridged and spoiled in the end of the 8th c. by Paul, son of Warnefried, commonly called Paulus Diaconus. The great work of Flaccus has unfortunately entirely perished, and of the abridgment made by F., only a single MS., and that in a deplorably imperfect condition, has survived. It came from Illyria, and fell into the hands of Pomponius Lætus, a distinguished scholar of the 15th century. It ultimately passed into the library of cardinal Farnese, at Parma, and is now preserved at Naples. The work, in spite of all its imperfections, is a grand storehouse of knowledge on points of mythology, grammar, and antiquities. All previous editions of F. of little value compared with that of K. O. Müller (Gött. 1839, 2d ed. 1880), but this is now superseded by the recent addition of Thewrewk de Ponor (Pesth, 1891).

FE/TIALES, or **FECEIALES**, Roman officers who acted in international affairs as heralds in the announcement of war to a foreign state, and by presiding over the solemnities attending the return of peace. Their duties were discharged with much ceremony. They were anciently citizens of high birth, were chosen for life, and were called *patres patrati*.

FETICHISM is the worship of a *fetich*. The word fetich comes to us from the Portuguese, who were the first Europeans that traded on the w. coast of Africa, and who expressed their idea of the religion of the natives by the Portuguese word *feitição*, "magic." This word, somewhat modified, passed into the French language, through Brosse's treatise, *Du Culte des Dieux Fétiches* (Dijon, 1760), and from him into German, through the medium of Pistorius (Stralsund, 1785). The term has now received European recognition. A fetich is anything in nature or art to which a magical power is ascribed, e.g., stones, carved figures, or certain parts of plants, animals, etc. In this general sense F. coincides with the belief in charms—a belief which is also to be found among monotheistic nations. The first step *out of fetichism*, is when ignorant tribes cease to be satisfied with believing merely in the magical power inherent in their fetiches, and begin to ascribe a certain conscious operation to the objects of their reverence, especially to the fetiches in the forms of beasts or men. In this way the fetich becomes an idol, and F. an idolatry. The lowest form of such idolatry is where the savage does not hesitate to throw away, to chastise, or even to destroy his fetich, if it does not appear to gratify his desires. The reverence for sacred woods, mountains, streams, etc., which formed part of the religion of the old Greeks, Celts, and Germans, is not F. proper, but rather belongs to the worship of nature.

FE/TID LIMESTONE, a variety of limestone which gives out on being violently rubbed or struck with a hammer, a smell like that of sulphureted hydrogen gas. It has a dark color, produced very probably from the perishable portions of the animals whose hard skeletons compose the rock. This animal matter may perhaps also be the cause of the disagreeable smell. Stinkstone or swinestone has been likewise employed as characteristic name for this limestone.

FÉTIS, **FRANÇOIS JOSEPH**, 1784–1871. He was the son of an organist, and played the organ in his native town (Mons, Belgium), when only 10 years of age. He received his musical education from the leading teachers at Paris, and then traveled in Germany and Italy, studying the works of the great masters. In 1806, he returned to Paris, married a wealthy lady, and was enabled to devote his time to studying the history of music. In 1813, financial misfortunes compelled him to return to the practice of his profession, and he accepted the position of organist and instructor at Douai. In 1818, he became a professor in the conservatory of Paris, and published about this time his *Traité du Contrepoint et de la Fugue*. In 1827, he founded and edited the *Revue Musicale*, a journal devoted to musical criticism. The time that he could spare from professional duties was devoted to researches upon the theory of harmony, to the preparation of articles for a number of journals, and to the composition of operas and pieces of sacred music. In 1833, he was appointed chapel master and director of the royal conservatory of Brussels. In 1864, according to instructions left in the will of Meyerbeer, he became his musical executor, and superintended the production of the opera *L'Africaine*. The most successful of his own operas was *La Vielle*, which had a run of 100 nights. His principal works are: *Biographie Universelle des Musiciens et Bibliographie Générale de la Musique*, and his *Traité Complet de la Théorie et de la Pratique de l'Harmonie contenant la Doctrine de la Science et de l'Art*.

FETLOCK, or **FETTERLOCK**. English heraldic writers speak of a horse fetlock or fetterlock, and represent it thus. It seems to have been an instrument fixed on the leg of

a horse when put to pasture, for the purpose of preventing him from running off. In Scotch heraldry, a hoop is usually substituted for the chain, and the fetlock is represented as in the arms of Lökkert (Lockhart) of Barre, given by sir David Lindsay; Argent, on a bend sable three fetterlocks *or*. Some branches of this family carry a man's heart within the fetterlock, one of the heads of it having accompanied good sir James Douglas with king Robert the Bruce's heart to Jerusalem (Nisbet, i. p. 325).

FEUD (Angl.-Sax. *faght*) seems to be only another form of the word *fight*, and is allied to *foe*, and probably to *fiend*. It meant a war waged by one family or small tribe on another, to avenge the death or other injury of one of its members. In a certain state of society, this is a legitimate mode of obtaining redress. It prevailed extensively among the nations of Northern Europe; and it was only by gradual steps that the practice was first restricted and then abolished. The laws of Rudolf I. of Germany recognized the right of waging feuds. At last, partial associations were formed, the members of which bound themselves mutually to settle their differences by courts of arbitration and compensation, without going to war.

FEUDAL SYSTEM. By some, the word *feu* or *feud*, of which *feudal* is the adjective, is derived from the Lat. *fides*, faith, and *ead* or *odh*, or *od*, a Teutonic word signifying a property, or estate, in land; whilst by others, with perhaps greater probability, the first syllable also is maintained to be Teutonic, equivalent to *vieh*, cattle, ultimately from the same root with the Latin *pecus*, which, in the form of *pecunia*, came to signify property, and its representative, money—because, as Varro remarks, property amongst pastoral nations consisted of cattle (Varr., *De Lingua Latina*, 5, 19, s. 95, ed. Müll.). A *feudum*, in this sense, would be a piece of land held for a *fee*, or pecuniary consideration, using *pecuniary* in the wide sense which its etymology suggests. Be this as it may, the feudal system, as a developed institution, belonged neither to the Teutonic nor to the Romanic nations, in their original and unmixed condition. We find it neither in the woods of Germany, nor in the Roman empire previous to the incursions of the Franks and Lombards. Neither the institutions described by Tacitus, nor those with which the Roman jurists have rendered us familiar, exhibit anything that is even analogous to it as a whole. But they each exhibit partial indications of some of the characteristics which most peculiarly distinguish it; and as it arose about the beginning of the 9th c., just when the fusion between the conquering barbarians and the subject populations of the Romanized provinces was everywhere taking place, it seems impossible to doubt that it was a result of the mutual influence of the two races. The subordination of class to class, and the intimate relations by which all the classes of the community were bound together, taken along with the independence and equality of the individual members of each class within itself, were amongst the most prominent features of the simple society of the Teutonic nations; and these correspond with wonderful accuracy to the relations of superior and vassal, beginning with the sovereign and descending to the smallest feudal proprietor, and also with the equality amongst *peers*, which existed within each of the feudal classes. On the other hand, the incomplete and fiduciary character of the proprietorship implied in a *feu*, as held in trust from a superior on the faith of services to be rendered, or dues to be paid, bore a very close analogy to the Roman *emphyteusis* (from which indeed the word *feu* has often been derived), and to the *dominium utile* as opposed to the *dominium directum*. See **DOMINIUM** and **EMPHYTEUSIS**.

The nature of this very important social institution, by which the life of every European people of any importance was governed from the beginning of the 9th till the close of the 13th c., and by which many of the forms of our modern life are still affected, will probably be more clearly understood if we commence our description of it from below, by exhibiting the position of the simple land-holder, than by adopting the monarch in whom it culminated, and from whom, in a technical sense, it was supposed to flow (see **ALLODIUM**), as our point of departure. The latter course has been more strictly adhered to by English writers, from the circumstance that, subsequent to the conquest, the whole territory of England was regarded as the property of the conqueror, and was by him divided amongst his barons, and by them amongst their dependents, an arrangement which was somewhat peculiar to England (see **ALLODIUM**), whereas the feudal system, in its essentials, was common to the whole of Europe. A feudal proprietor, then, or feudatory, was a person who held his lands from another, for his own life-time merely, in the earlier times, on condition of certain services which he was to perform to a superior or suzerain. Apart from the duties to which he was thus bound, he was not only a free man, but his position was that almost of an independent sovereign within his own small dominions. If his holding was at all an extensive one, he lived in a castle, which, notwithstanding the efforts of Charlemagne and his successors to prevent it, was generally fortified, not only for purposes of defense, but to enable him to pursue that life of rapine which in lawless times was not considered inconsistent with honesty or personal worth. For greater security, the castle was generally situated on a height, and under its walls there nestled a village, in which all the dependents of the proprietor, with the exception of his immediate family, and all those who lived by the cultivation of the soil, usually dwelt—isolated farm-houses and cottages being too much exposed to plunder to admit of their being scattered over the country then, as we see

them in England now. A portion of the inhabitants of each feudal domain were usually bound to the soil, and were thus subject to a species of slavery, the conditions of which varied according to the customs of different districts. These were spoken of as *adscripti* or *adscriptii glebe*, and were called *nativi*, or bond-men, and *villein-socmen*, as opposed to free soc-men on the one hand and serfs or *theowes* on the other, of whose position we shall speak below. (Stephen's *Com.* i. p. 188.) "He was," says sir Francis Palgrave, speaking of the ceorl, "a villain appurtenant; and, notwithstanding the language which was employed (to the effect, namely, that he could be bequeathed, bought, and sold), it must be understood that the gift, the bequest, or the sale, was in effect the disposition of the land and of the ceorl, and of the services which the ceorl performed for the land, a transaction widely differing from the transfer of a slave, whose person is the subject of the purchase." (*Rise and Progress of the English Commonwealth*, vol. i. p. 18.) The ceorl, moreover, could purchase his own freedom and that of his wife and offspring (*ib.*). See SERF. The rest were free tenants, farmers in the modern sense, though personal services to the proprietor probably in almost every case constituted a portion of the rent which was paid. Latterly, when the system of subinfeudation was introduced, many of his wealthier tenants came to stand to the baron, or lord of the domain, very much in the relation which we are about to describe as subsisting between him and his lord paramount. From being tenants-at-will, scarcely less subject to his authority and exposed to his caprices than the thralls, or villeins of the lowest class, they became vassals of their lord, and free citizens of what thus gradually developed itself into a feudal monarchy in miniature. The tenure by which this latter class held their lands was generally known in England as free socage (Stephen's *ut sup.* i. 205 *et seq.*). The castles by which the banks of the Rhine are studded along its whole course, from Bonn to Bingen, with their villages and parish churches, for the most part in the condition in which they were erected centuries ago, afford the most numerous and perfect examples of the arrangements of the feudal period which are perhaps anywhere to be met with. The possessors of these castles stood in a magisterial as well as a proprietary relation to their dependents. They exercised jurisdiction, extending even to the infliction of capital punishment, either in person or by means of officers whom they appointed for the purpose; and the castle was in general furnished with dungeons and other appliances for carrying their sentences into execution. Towards each other they stood in the relation of equals, or peers (Lat. *pares*); they were neighbors, simply, and friends or enemies as the case might be—too often the latter. But towards their immediate feudal superior, the count, marquis, duke, or whatever might be his title, to whom the government of the whole district belonged, they all stood in a relation which brought them in contact, and in some degree bound them to each other. Of him they held their lands on conditions somewhat similar to those on which they let them out to their own dependents. At first, as we have said, they were only tenants for life; but their rights in most countries very early assumed a hereditary character, the dominant proprietor's rights, on the death of a tenant, being confined to the exaction of certain dues from his son and successor, as a consideration for conferring on him, or rather for confirming to him, the feu which his father had held. Where the feu, fief or feoff, as it was sometimes called from the mode of admission—feoffment, or as it is said in Scotland, infettment (q.v.)—descended to a female, the dominant proprietor was entitled to control her marriage, for the purpose of procuring himself a sufficient and trustworthy vassal; a privilege which, like all those of the lord, was latterly converted into a mere pecuniary claim. When the lord paramount, or suzerain, as he was called, held his court of justice, his vassal barons were the judges, being all on a footing of equality, or *pares curie*, as it was called. When he made war, either on his own account, or as furnishing a contingent to the army of the state, in such cases as in the national wars between France and England in the 12th and 13th centuries—which were the earliest instances of really national wars—his vassals were bound to attend him in person, and to furnish each the contribution of men, horses, arms, and other materials of war for which he was liable by the tenure on which he held his lands. In addition to these services, he was bound to watch and ward his castle, a duty which the minor barons almost invariably imposed on their vassals when the system of granting feus extended downwards to the class of persons who had formerly been mere tenants-at-will. Then there were certain dues which were almost always exigible from the vassal, such, e.g., as contributions towards providing a ransom for his lord when in captivity, for enabling him to celebrate the marriage of his eldest son with due pomp, or to provide a suitable dowry for his daughter. If these dues were not paid, the land reverted to the dominant proprietor, in relation to whom the vassal all along was a mere usufructuary. So far were the conditions of feudal holdings from being always the same, that no less than eighty different tenures have been enumerated; the onerous character of which varied from what was merely nominal, e.g., the payment of a white rose or a pair of spurs, "if asked merely," up to what was a rent in some degree equivalent to the value of the land. For an account of the manner in which the feudal system affected the constitution of land rights and the conveyance of landed property, and still affects them, see CONVEYANCING.

Inferior to all the classes of society in feudal Europe of which we have hitherto spoken, there is reason to fear that there existed almost everywhere, in the earlier times,

a class of the positively unfree. The lot of those who were in absolute slavery excluded them from the influences of feudality as a legal and social institution—"they were not reckoned," says Palgrave, "amongst the people"—but their existence is by no means to be left out of account, in forming to ourselves a picture of European society in feudal times. Of the condition of this class, as forming the substratum of feudal society, we shall have a pretty accurate conception from the following passage, in which Lappenberg describes them in Anglo-Saxon times, if we bear in mind, on the one hand, that subsequently to the conquest their ranks were probably swelled by such of the Anglo-Saxon population as was in absolute poverty; and on the other, that their position, in all the countries of Europe, was gradually ameliorated by the influences of Christianity, the spirit if not the letter of which has everywhere proved hostile to slavery. "One class of the Anglo-Saxon population, at the period of the Norman conquest, consisted of the unfree or servile (*theowas*, *esnas*), whose number, as registered in domesday-book, was little above 25,000. Of these, the majority were in a state of slavery by birth, whose forefathers had been either Roman slaves, British prisoners of war, or other enemies. Others, denominated *wite-theowas*, or penal slaves, had been freemen, but reduced by the sentence of the law to the servile condition, on account of debt or delinquency. (Palgrave *ut sup.* i. 28.) The master had the right of selling the theow in the country, but not beyond the sea, even if he had perpetrated crime. In other respects, the condition of the servile seems to have differed little from that of the indigent free slaves who had a special *wergild*, half of which fell to the master and half to the kin." (Thorpe's Lappenberg, ii. p. 320. It is probable that the vast majority of the servile class in Anglo-Saxon, and even in Norman times, consisted of persons of Celtic blood. (Palgrave *ut sup.* p. 26.) In proof of this fact, Lappenberg remarks that their numbers diminish as we recede from the Welsh border and from Cornwall, the places in which the Celtic or original British population is known to have taken refuge.

The social elements which counteracted and mitigated the influences of feudality in mediæval life, were monarchy, the church, which vigorously promoted the emancipation of the unfree, and above all, the growing wealth, power, and importance of the commons. In order to free himself from the rude and insolent dictation of his great feudal vassals, the king, in almost every European state, courted the alliance of the feudal communities, who had remained more in the condition in which they had been left by the Romans than the inhabitants of the country, and who were consequently all along more or less opposed to the growth and influences of feudality. See MUNICIPALITY. By their aid, even before the formation of standing armies, something approaching to executive power was placed in the hands of the sovereign. He was thus enabled to appoint and enforce the decrees of independent judges of his own, who in the earlier times were generally churchmen, and thus greatly to circumscribe the power and influence of all classes of feudal proprietors over their dependents. Though the period of bloom of the F. S. was, as we have said, from the 9th to the 13th centuries, in most of the countries of Europe, it everywhere, in many of its features, long survived the latter period. Even considered as a social, and not merely as a legal institution, in which latter capacity it still exists, it was in many respects in vigor in Scotland down to the year 1747, when military tenures were abolished by statute, as dangerous to public tranquillity.

FEU DE JOIE, or "running fire," a discharge of musketry into the air, made in honor of a victory or other great occasion. It commences with the right-hand man of the line, who discharges his rifle, and is followed successively, at scarcely perceptible intervals, by the men on his left, until the extreme left of the line is reached. The effect much depends on the regularity with which the slight interval between the discharges is preserved.

FEUERBACH, LUDWIG ANDREAS, German philosopher, fourth son of the following, was b. at Anspach, 28th July, 1804. After studying theology for two years at Heidelberg under Paulus and Daub, in 1824 he was attracted to Berlin for the purpose of hearing Hegel, and, soon after he abandoned theology, with the view of devoting himself entirely to philosophy. In 1828, he became *privatdocent* in the university of Erlangen, but in a few years quitted the academical chair, and gave up his whole time to literary labor. In a small anonymous work (*Gedanken über Tod und Unsterblichkeit*, Nürnberg, 1830), which attracted little attention when it appeared, he indicated that he had already gone beyond the stand-point of his master Hegel, by combating the doctrine of immortality. During the next few years, he published three works on portions of the history of philosophy, treating severally of the period between Bacon and Spinoza, of Leibnitz and of Pierre Bayle. But these historical works only paved the way to a critical investigation into the nature of religion and its relation to philosophy, the results of which have been given to the world in several works well known to speculative theologians. The most celebrated of these is his work on the Nature of Christianity (*Das Wesen des Christenthums*, Leip. 1841; 2 Aufl. 1843), which has been translated into English. Starting from the Hegelian doctrine, that the absolute comes to consciousness only in humanity, F. denies to it any existence beyond the human consciousness, maintaining it to be merely the projection by man of his own ideal into the objective world, on which he feels his dependence. All authority above man, and consequently all moral obligation, is therefore consist-

ently regarded as a delusion proceeding from man himself, and the highest good is explained as that which is on the whole most pleasurable. Yet even this highest good is further explained as consisting in resemblance to that ideal humanity which man creates for himself, and worships as God. A kind of ideal theism is therefore retained by F.; but when his doctrines were adopted by the mass of German communists, they degenerated, perhaps logically, into an actual atheism, which ignored any moral or social law imposed on the individual from any other source than himself.—The works of F. have been collected, with additions and corrections to bring them into accordance with his later views (*F.'s Sämmtliche Werke*, 10 Bde., Leip. 1846–66). He died 13th Sept., 1872. See Karl Grün's *Ludwig F.* (1874), and Beyer's *Leben und Geist F.'s* (1873).

FEUERBACH, PAUL JOHANN ANSELM, RITTER VON, one of the most distinguished criminal jurists of Germany, was b. at Jena, 14th Nov., 1775. Brought up at Frankfurt-on-the-Main, where his father was an advocate, and educated in the gymnasium there, he went in 1792 to Jena, where he cultivated his mind by the study of philosophy, and then devoted himself to positive law. In 1798, he appeared as criminal jurist in a work *On the Crime of High Treason*, and in the following year he began to deliver lectures in the university of Jena. In his lectures and published writings, he introduced into criminal jurisprudence a new method of treatment, which was systematized in his compendium of German penal law (*Lehrbuch des Gemeinen, in Deutschland geltenden peinlichen Privatrechts*, Giessen, 1801; 14 Aufl. von Mittermaier, 1874). This celebrated work placed F. at the head of a new school of jurists, who maintain that the decision of the judge in every case ought to be determined solely by an express deliverance of the penal law, never by his own discretion, and who on that account obtained the name of rigorists. In 1801, F. was appointed ordinary professor in Jena, but in 1802 accepted a call to Kiel. In 1804, he was removed to the university of Landshut; but next year, having received a commission to prepare a penal code for Bavaria, he was transferred to Munich as privy referendary for the ministerial, judicial, and police departments; and in 1808 was appointed privy-councilor. The new penal code which he planned for Bavaria (*Strafgesetzbuch für das Königreich Baiern*, München, 1813), received, after a few modifications, the royal approval, and was taken as a basis in the emendation of the criminal law of several other countries. During this period also, he published his Remarkable Cases in Criminal Law (*Merkwürdige Criminalrechtsfälle*, 2 Bde., Giessen, 1808–11), which first led the way to a deeper psychological treatment of such cases. In 1812, he published a work on trial by jury, to which a second volume, on the judicial procedure of France, was added in 1825, as the result of a visit to Paris in 1821. In 1817, he became second president of the court of appeal in Bamberg, and afterwards first president of the court of appeal at Anspach for the Rezat district. In 1832, he published a work on the unfortunate Kaspar Hauser, whose mysterious fate had strongly attracted his interest. He had just edited a collection of his miscellaneous writings, when he died at Frankfurt-on-the-Main, 25th May, 1833. An interesting life of F. has been written by his son, Ludwig (*Leben und Wirken Anselm von Feuerbachs*, 2 Bde., Leip. 1852). F. left, besides three daughters, five sons, who have all distinguished themselves in German literature.

FEU AND FEU-DUTY. A feu may be described, in familiar language, as a right to the use and enjoyment of lands, houses, or other heritable subjects, in perpetuity, in consideration of an annual payment in grain or money, called *feu-duty*, and certain other contingent burdens called casualties of superiority (see *CASUALTY*). Though a feu was frequently used to express any kind of tenure by which the relation of superior and vassal was constituted, in its narrower meaning, which we have here indicated, and which is that in which it is now almost exclusively used, it was opposed, on the one hand, to those tenures in which the return consisted of military or other personal service (ward and the like), and, on the other, to those in which the return was illusory (blanch), the only object of which was to preserve the relation of superior and vassal. A feu, in short, was a perpetual lease—a feu-farm, as it was often called—by which the tenant became bound to pay a substantial consideration, and his rights under which he might forfeit, as the penalty of non-payment. In the present day, the disposal of land in feu is practically a sale for a stipulated annual payment, equivalent to chief rent. It is in this light, accordingly, that feus are generally regarded in Scotland; and though feus resemble English freeholds in substance, their forms agree mostly with copyhold tenure. See Paterson's *Compendium of English and Scotch Law*. The system of feuing property for building purposes seems to have several advantages over that of the long building-leases common in England. From its perpetual character, it gives to the person actually in possession a feeling of greater interest in the property, and usually leads him to erect more enduring structures than he probably would do under a lease. For as time runs on, the feu often increases in value, while the reverse must always be the case with leasehold property. Neither does it in any degree interfere with the letting of property on lease or otherwise. Almost all the houses in Edinburgh and the other towns in Scotland which are let, either on leases or from year to year, are held by those who are spoken of as their proprietors not in absolute property, but as feus. Modern feu-duties are in general paid in money. When the stipulation is for a duty in grain, the quantity is valued by fiar prices for the year (see *FIARS*), and paid in money accordingly. The deed transferring the land in feu from the superior to the vassal is called a feu-charter

—a clumsily conceived and expensive document, which requires renewal in the case of heirs to vassals, or of parties to whom the vassal sells his right; and this repetition of the transaction, designated as "entering with the superior," forms the heavy drawback on the acquisition of land in feu, no matter how small in amount. Usually, the feucharter reserves to the superior all minerals in the ground, and stipulates that the vassal shall build his house either in a particular style or of a certain value. By the Scottish stat. 1597 c. 246, it is declared that all vassals by feu-farm failing to pay their feu-duty for two years together, shall lose their right, in the same manner as if an irritant clause had been specially engrossed in their charter. But as the superior must obtain a decree declaring the loss of the vassal's right, before the forfeiture can take effect, if the feu is worth keeping, the duties, as a matter of course, will be paid. In the very rare case of the property having fallen off in value to the extent of rendering the feu a positive burden, it is possible that the irritancy may be voluntarily incurred. For the most part, land proprietors near towns and manufacturing villages are anxious to add to their annual rental by feuing grounds for building purposes. The rate of feu is very various, from as low as £8 to as high as £500 per acre per annum; a common rate is from £20 to £30 per acre. Whatever be the amount, it is payable by the feuar—not the tenant to whom the feuar may have let the property. When a building consists of several floors forming distinct dwellings, the feu-duty is allocated in certain proportions among the respective proprietors; the feuar to whom the lower floor belongs usually paying most. In properties of this kind, each is responsible only for his own share. Occasionally, feu-duties are offered for sale; and as a safe investment, bring from 25 to 30 years' purchase. In such cases, the vassal has an opportunity of extinguishing his feudal tenure, and becoming the superior. There are also instances of vassals sub-feuing. It is customary in feuing building lands for the superior to make the roads and drains. Relieved of this obligation, and getting possession of a site on a mere prospective annual payment of perhaps only a few shillings, the feuar has an undoubted advantage; looking, however, to the cumbersomeness and cost of the feu-charters, and the liability of successors to pay fines at entry, the system is entangled, troublesome, and expensive; and, at least as far as forms are concerned, is allowed to stand in need of reform.

FEUILLANS, CONGREGATION OF, a reform of the Cistercian order, remarkable as forming part of the great religious movement in the Roman Catholic church during the 16th c., contemporary with and probably stimulated by the progress of the reformation. The author of this reform was Jean de la Barriere, abbot of the Cistercian monastery of Feuillans, who, painfully struck by the relaxation of its discipline, laid down for himself a new and much more austere course of life, in which he soon found many imitators and associates among the brethren of his order. The rule thus reformed was, after considerable opposition from the advocates of the old rule, approved, with certain modifications, by Pope Sixtus V.; the reformed congregation, however, being still left subject to the authority of the abbot of Cîteaux; and a convent was founded for them by Henry III. in the Rue St. Honoré, Paris. The subjection to the abbot of Cîteaux was removed by Clement VIII. in 1595; and Urban VII., in 1630, separated the congregation into two branches, one for France, and the other for Italy, each under a distinct general. The rules of both these branches were subsequently modified about the middle of the same century.

The celebrated revolutionary club of the Feuillants took its name from this order, the convent of which, in the rue St. Honoré, was the place of meeting for the members of the club. It was founded in 1790 by Lafayette, Sièyes, La Rochefoucauld, and others holding moderate opinions. The club was at first called the "Company of 1789," and was intended to support the constitution against the ultra party. It reckoned among its members individuals of all classes, who took the constitution of England as their model. This opposition served, however, only to accelerate the revolutionary movement. On the 27th Jan., 1791, on count Clermont Tonnerre being elected president of the club, a popular insurrection broke out against it; and, on the 28th Mar., the assembly in the cloister was forcibly dispersed by a raging mob.

FEUILLEA, a genus of plants of the natural order *cucurbitaceæ*, named in honor of Louis Feuillée, a French botanist and traveler in Chili. The species are generally half-shrubby climbers, natives of the warm parts of America. The seeds, at least of some of them, as *F. cordifolia* and *F. trilobata*, contain a great quantity of a bitter fixed oil, which is obtained by expression, and is used for lamps. It has also a high reputation in the West Indies and Brazil as a cure for serpent bites, and an antidote to some kinds of vegetable poisons.

FEUILLET, OCTAVE, b. 1822; a French novelist and dramatist; was educated in the college of Louis-le-Grand, of Paris. His early writings were published under the name of "Désiré Hazard," *Le Grand Vieillard*, written in 1844, conjointly with Paul Bocage and Albert Aubert, being the first. Feuillet afterwards became a constant contributor to newspapers and reviews, besides writing many comedies, dramas, and farces, which achieved popularity. He was elected to the French academy in 1862, and in the following year was made an officer of the legion of honor. Afterwards he was appointed librarian of the imperial residences, which position he held until the revolution of Sept., 1870. His most noteworthy dramatic productions are: *La Nuit Terrible*; *Le Bourgeois de Rome*;

La Crise; Le Pour et la Contre; Pêril en la Demeure; La Fée; Le Village; Dalila; Le Roman d'un Jeune Homme Pauvre; La Tentation; La Rédemption; Montjoye; La Belle au Bois Dormant; Le Cas de Conscience; Julie; La Clé d'Or, a comic opera; and *L'Acrobate*. Among his novels are *Polichinelle; Onesta; Rédemption; Bellah; Le Cheveu Blanc; La Petite Comtesse; Le Roman d'un Jeune Homme Pauvre*, which has been translated into many languages; *Histoire de Sibylle; Monsieur de Camors*, a story remarkable for invention and vigor; *Julia de Trécœur; Un Mariage dans le Monde*; and *Le Journal d'une Femme*. He was also the author, jointly with Paul Bocage, of a number of other dramas, and published several poems. He died December, 1890. See the memoirs by Mme. Feuilleton (1894).

FEUILLETON (Fr.), literally a small leaf, signifies that portion of a political newspaper set apart for intelligence of a non-political character, for criticisms on art, literature, etc., and usually separated from the main sheet by a line. The F. is an invention of the *Journal des Débats*, which, since the year 1800, has held an important place in the sphere of literary criticism. By degrees, the belles-lettres element began to pervade it; and the result was a species of light journalistic literature, in which Jules Janin became the acknowledged king. In the years immediately preceding the revolution, Feb., 1848, entire romances were spun out in the feuilleton. The *Constitutionnel*, in particular, made large pecuniary profits by the social romances of Eugene Sue, which it published in this manner. The French system has been imitated in England and Germany, though with less success than in France.

FÉVAL, PAUL HENRI CORENTIN, b. 1817; a French writer of fiction, bred to the law, which he soon abandoned for authorship. His novels are numerous, and a number of them have appeared in English, among them *The Mysteries of London; The Duke's Motto; The Devil's Son; The Woman of Mystery; Thrice Dead; The Chevalier of Keramour*, etc. In 1876 he became a Roman Catholic, and wrote in defence of the Jesuits. See his *Les Étapes d'une Conversion*. He d. 1887.

FEURS, a town in France, in the department of Loire and situated on the river Loire 31 miles w. of Lyons. It was the capital of the old division of Forez. It has a decorated Gothic church, which is in part modern. Pop. of commune, '91, 3492.

FEVER (Lat. *febris*, from *ferveō*, I grow warm, or perhaps from *feruō*, I cleanse), a form of disease characterized principally by increase of the temperature of the body, which, however, requires to be estimated according to the state of the internal parts, rather than the external; the surface of the body, and particularly of the extremities, being not unfrequently cold rather than warm. Having regard to the heat of the surface only, F. has commonly been considered as passing through three distinct stages, more or less marked: 1, the cold or shivering stage; 2, the hot stage; 3, the sweating stage. This description is perfectly correct in most cases, but it requires to be qualified by the remark, that even in the cold stage of fevers, it is now well ascertained that the blood and the internal organs have an elevated temperature, as estimated by the thermometer introduced into the cavities of the body. In the cold stage of F., accordingly, and even in the most violent ague, when the teeth are chattering with cold, and the whole surface is pale and clammy, the state of the system is well expressed by the aphorism of Virchow (the most ingenious and comprehensive of the modern exponents of the pathology of F.), to the effect that "the outer parts freeze while the inner burn." Increased heat of the body, therefore, is the most essential, perhaps the only essential phenomenon of fever. The other symptoms are loss of appetite, thirst, restlessness, and vague general uneasiness, often headache, and diffused pains in the back and limbs; a frequent pulse, which is sometimes also full and hard; a furred tongue, often with red margin; a flushed face and suffused eyes; vitiated secretions, and general derangement of the functions, with great debility of the voluntary movements of the limbs. The disease often commences with a shivering, or rigor, as it is technically called; this leads through the cold stage to the hot, which usually follows pretty rapidly, and is attended by all the febrile phenomena in their highest degree; the skin being often very pungently warm to the hand, dry, and harsh; by and by, the pores appear to open, moisture begins to bedew the surface, and the pungent heat disappears: the disease is then about to pass into its third or sweating stage, which ushers in the convalescence. For the special symptoms of particular fevers, see AGUE; INTERMITTENT FEVER; MEASLES; REMITTENT FEVER; SCARLATINA; SMALL-POX; TYPHUS AND TYPHOID FEVERS; YELLOW FEVER.

Besides being thus the leading fact in a number of specific diseases, F. is also associated with many other forms of disease as a secondary or subordinate phenomenon, connected with an inflammation or other distinctly local disease. Thus, in pneumonia (q.v.) or enteritis (q.v.), F. is as much a part of the symptoms as pain or any other; and even in some chronic or long-standing diseases, as in consumption (q.v.), a slow and consuming type of F. (see HECTIC FEVER) is found to be very generally present. Indeed, there is no condition which rules so large a part of the physician's duty, whether in the way of distinguishing diseases or of curing them, as this constitutional state. F. is also very generally prevalent after surgical operations and injuries, of which it constitutes one of the leading dangers; and in midwifery practice, it is well known as constituting a large part of the risks of the puerperal state, whether in the slighter form commonly

called a *weed*, or in the more dreaded and fatal, often epidemic, form of puerperal fever (q.v.)

The family of fevers is thus separated pretty naturally into two large groups, in one of which the F. is the greatly predominating fact, and determines the specific character of the disease; the local disease (if present) being quite subordinate, and usually secondary in point of time; the other, where the opposite order prevails, and the F. is obviously secondary. Hence the distinction embodied in medical language between *idiopathic* (i.e., self-originating, spontaneous), and *symptomatic* or secondary fevers. Fevers are also distinguished, with reference to their mode of diffusion, as epidemic (q.v.) and endemic (q.v.); or with reference to their supposed cause, as contagious, infectious, malarious, pneumonic, rheumatic, etc.; or with reference to their incidental symptoms and their peculiarities of course and termination (the presumed *specific* phenomena attracting, of course, particular attention), as eruptive (see EXANTHEMATA) or non-eruptive, bilious, gastric, enteric, mucous, putrid, malignant, typhoid, etc.

Among these distinctions, based upon the course of the F., one demands particular notice, as involving an important law of febrile diseases generally, and of a large class of fevers of warm climates in particular. Periodic increase and diminution, or paroxysms of longer or shorter duration, with intervals of more or less perfect relief from all the symptoms, are characteristic of most diseases of this kind, but especially of those arising from *malaria*, i.e., emanations from the soil, educed under the influence of solar heat. The duration of the paroxysms and of the intervals, the complete *intermission*, or more partial *remission*, of symptoms, become in such cases the characteristic facts that mark the *type*, as it is called, of the F., which is accordingly distinguished as intermittent, remittent, or continued; and, according to the length of the periods, Tertian, Quartan, Quotidian, etc.

The true pathology, or ultimate essence of the febrile state, is still a subject open to question; but it is in accordance with modern physiology to regard F. as connected with some complex derangement of the functions on which the animal heat is known to depend—viz., the nutrition of the textures, or the vital changes constantly in operation between the blood, on the one hand, and the ultimate atoms of solid texture, on the other. Recent observations have shown that, in the paroxysm of ague, the waste of the nitrogenous tissues is in excess; and further, the curious result appears to be arrived at, that for almost every grain of excretion representing this excess of waste in a given time, there is a proportional increase of the temperature of the blood, according to accurate thermometric observations. If such observations are corroborated and extended, it will probably appear that the cause of F. is to be found in an increased destructive decomposition of the atoms of texture through the oxygen absorbed at the lungs and circulated with the blood; perhaps under the influence of a derangement of nervous system; which has been shown by experiment to have a very marked control over the generation of animal heat.

The treatment of F. will be considered under the separate forms already referred to.

FEVER BUSH, a shrub common in the northern states, remarkable for graceful form and beautiful leaves; the *benzoin odoriferum* of Nees. It is from 4 to 10 ft. high, and grows best in moist and shady places. A decoction of the twigs is used as stimulant in fevers, and to cure the itching which follows vegetable poisoning. The berries have occasionally been used as a substitute for allspice, and sometimes the shrub is called spice bush.

FEVERFEW (*pyrethrum parthenium* or *matricaria parthenium*), a perennial plant, found in waste places and near hedges in America and many parts of Europe. It is botanically allied to chamomile (q.v.), and still more nearly to wild chamomile (*matricaria chamomilla*), and much resembles these plants in its properties, but differs in appearance, the segments of its leaves being flat and comparatively broad, and its flowers smaller. Its habit of growth is erect, its stem much branched, and about 1 to 2 ft. high. It has a strong, somewhat aromatic smell. It was once a popular remedy in ague, and from time immemorial has been used as an emmenagogue. It is employed in infusion, and is stimulant and tonic. A double variety is not uncommon in gardens.—Of the same genus with F. is the MAYWEED (*P. inodorum* or *M. inodora*), with leaves more resembling those of chamomile, but almost scentless, and large flowers, with white ray and yellow disk, very common in cornfields and waste places in America and throughout Europe.

FEVERWORT (*triosteum perforliatum*), a perennial plant of the natural order *Caprifoliaceae*, having an erect, round, hairy, fistular stem, from 1 to 4 ft. high, opposite ovate-lanceolate entire leaves, axillary whorls of flowers, with tubular 5-lobed corolla, and leathery 3-seeded berries. It is a native of North America, where its dried and roasted berries have been occasionally used as a substitute for coffee; but it is chiefly valued for its medicinal properties, its root acting as an emetic and mild cathartic. It is sometimes called *Tinkar's root*, from Dr. Tinkar, who first brought it into notice.

FEYDEAU, ERNEST-ALMÉ (1821–1873), a popular French novelist, b. in Paris. He married a daughter of Blanqui, the economist, which led him, for a time, to forsake the vocation of letters, in which his success had been only mediocre, and turn his attention to exchange transactions. In 1858 he published his novel, *Fanny*, the remarkable

success of which confirmed him in his original idea, and he confined himself thereafter to the literary profession. His novels depicted principally only the lower traits of character, descriptions of the intrigues and corrupt manners of a certain portion of French society, which he dexterously excused. He also wrote several plays and a history of the funeral customs of the ancients. He died in Paris in 1873.

FEW, WILLIAM, 1748-1828; lived in North Carolina, Georgia, and New York. He was a member of the convention to frame the constitution for Georgia; a member of the state assembly and of the council. He was a col. in the revolution, surveyor-gen., judge of a county court, and delegate to the continental congress. He assisted in framing the federal constitution, and in urging its adoption by his state. Subsequently he was a member of two state constitutional conventions of Georgia, United States senator, a judge, and mayor of New York.

FEZ (Ar. *Fas*), the chief and most northerly province of the empire of Morocco, occupies the country between the Atlas mountains and the Mediterranean. Its population is estimated at about 3,200,000, consisting of Berbers, Moors, Arabs, negroes, Jews, and a few Europeans. The province is divided into 15 districts.—FEZ, the capital of the province, in lat. 34° 6' n., and long. about 5° 0' w., was founded by Muley Edris II., in the year 808 A.D., and was reckoned during the middle ages—when it was the capital of the kingdom of Morocco—one of the most magnificent and largest cities in the Mohammedan world. It is said to have contained about 90,000 dwelling-houses and about 700 mosques, and was celebrated for its splendid public buildings, schools, and scientific institutions. On the removal of the court to Morocco, about the middle of the 16th c., F. gradually fell into decay. It is still, however, a place of considerable importance. The situation of F. is singular; it lies in a valley, formed by surrounding hills into a sort of funnel, the higher parts of which are covered with trees, orange-groves, and orchards. It is divided into Old and New F. by one of the upper branches of the Sebu, and has a population variously estimated at from 100,000 to nearly 150,000 souls. There are 100 mosques, of which the most important is that built by the sultan Muley Edris, which contains his monument, and is an inviolable refuge for criminals, however guilty. On account of its numerous mosques and relics, it is regarded as the holy city of the western Arabs. It has seven well-attended schools. The old palace of the sultan is large, but is now falling into decay. In other respects, the external aspect of F., with its numerous baths, caravanseras (of which there are about 200), and bazaars, resembles that of Mohammedan towns in general; the multitude of hotels and shops alone imparting to it a peculiar and more European character. A considerable trade is still carried on, by means of caravans, with the adjoining countries on the s. and e., extending as far as Timbuctoo. F. carries on manufactures of woollens, sashes, silk-stuffs, girdles, slippers, fine carpets, etc. Its artisans are also skillful workers in gold and jewelry.

FEZ, a red brimless cap of fine wool, fitting closely to the head, with a tassel of black or blue, worn in Turkey, Persia, Greece, Albania, Egypt, and on the shores of the Levant generally. The name was derived from the town of Fez, where such caps were first made. At present the best fezes are manufactured in Tunis, but fezes of fair quality are made in Germany, France, and Switzerland. In Africa they are usually called *turbāsh*.

FEZZÂN' (more correctly, FESSÂN), an extensive oasis in the n. of Africa, in 24° to 31° n. lat., and 12° to 18° e. long. It lies s. of the regency of Tripoli, and has a population variously estimated at from 75,000 to 200,000 souls. The n. is for the most part hills, but the hills are composed of perfectly bare black quartz sandstone, with no rivers or brooks among them, and the s. is mainly a level waste of dry sand. Not more than a tenth of the soil is cultivable. In the neighborhood of the villages, which are situated mainly in the wadies, wheat, barley, etc., are cultivated, but dates are the principal article of food. Camels and horses are reared in considerable numbers. Lions, leopards, hyenas, jackals, wild-cats, porcupines, vultures, ostriches, buzzards, etc., are found in abundance. The climate is intensely hot. The inhabitants are a mixed race, of a brown color, in many respects resembling the negroes, but are generally well formed. The original inhabitants belonged to the *Berber* family, but since the invasion of the country by the Arabs in the 15th c., the traces of this native north African element have gradually become very faint. The chief elements in the population are Tuaregs, Arabs, Moors, and negroes. The language spoken is a corrupt mixture of Berber and Arabic. The people are far behind in civilization, and occupy themselves with gardening and the manufacture of the most indispensable necessities of life. Considerable trade in senna, ivory, and gums, is carried on by means of caravans between the interior of Africa and the coast. F. is the Phazania of the ancients, against which the Romans, under Cornelius Balbus, undertook a campaign about 20 B.C. During the classic period, as well as in the middle ages, it was governed by its own princes, who were at first independent, but afterwards became tributary to the pashas of Tripoli. In the year 1842 F. was conquered by the Turks, and is now attached to the government of Tripoli. It is under the direct government of a tributary chief, who takes the title of Sultan and resides at Murzuk, the capital of F., a well-built town, with a considerable trade. In the north the chief town is Sokna, and the region is said to contain nearly a hundred other towns and villages.

FFOULKES, EDMUND SALUSBURY, b. Eriviatt, Denleigh, Eng., 1819; was educated at Jesus coll., Oxford, of which he became a fellow, subsequently a tutor, but resigned both appointments when he went over to the Rom. Cath. church, 1855. In 1870 he created a temporary sensation by returning to the Anglican communion, and since 1876 has been rector of Wiggington. He has published *A Manual of Ecclesiastical History, Christendom's Divisions, The Athanasian Creed, Difficulties of the Day and How to Meet Them*, etc.

FIACRE, SAINT, an anchorite said to have been a son of Eugenius IV., king of Scotland. He lived in the 7th c., and voluntarily renounced the world, going to France to counsel with St. Faro, bishop of Meaux. The bishop gave him a residence in the forest of Breuil, in Brie, where he built a cell and gave asylum to such strangers as fell in his way. After his death, about 670 A.D., his shrine had the reputation of working miracles, and pilgrimages to it began. These pilgrimages created such a demand for conveyances as to give the name of the saint to a hackney-coach, which in France is called a *fiacre*. St. Fiacre is the patron saint of gardeners.

FIAR. See **FEE AND LIFE-RENT**.

FIARS (a word said by Jamieson to be of Gothic origin, and to exist in the same form in Icelandic). The *fiars* prices in Scotland are the prices of the different kinds of grain of the growth of each county for the preceding crop, as fixed by the sentence of the sheriff, proceeding on the report of a jury summoned for the purpose, before whom the evidence of farmers and corn-dealers is produced. The values thus officially ascertained serve as a rule for ascertaining the prices of grain in all contracts where they are not fixed by the parties; and in many sales it is agreed to accept the rates fixed by the *fiars*. Ministers' stipends, in so far as they consist of grain and crown dues, are also paid by the F. prices of the county for each year. With a view to the latter, F., in former times, were struck in the exchequer. An error in striking the F. will not afford a ground of suspension.

The form of procedure in "striking the fiars," as it is called, is regulated by act of sederunt, 21st Dec., 1723, renewed 29th Feb., 1728. The time fixed by this act for summoning the jury is between the 4th and 20th of February.

FIASCO, a term borrowed from the Italian theater, and now naturalized in France and Germany, besides being occasionally used by English writers. It signifies a failure to please on the part of an actor or singer, and is thus the opposite of *furore*, although why the word, which simply means a bottle, should come to be thus applied, is more than anybody knows. In Italy, it is not uncommon to hear an audience cry out, "*Olà, olà, fiasco*," even when the singer has only made a single false note.

FIAT, in English law, a short order or warrant of some judge for making out or allowing certain processes.

FIAT MONEY is inconvertible paper money, not even containing a promise to pay, but issued by the state with the bare assertion of its identity with true money, although no provision is made for its exchange for specie. Fiat money was issued in colonial times to a considerable extent, and the history of its rapid depreciation and final worthlessness is well known. When a government is forced to this measure, the state of its finances is virtually bankruptcy. The name "fiat money" was first given to irredeemable paper currency during the so-called Greenback agitation in the U. S. after the civil war, from the claim of the Greenback party that the *fiat* of the government could itself give value to a circulating medium.

FIBER. See **MUSQUASH**.

FIBER (Lat. *fibra*), a term of very common use as applied to objects of a stringy or thread-like character, whether of the animal, vegetable, or mineral kingdom. Minerals are often described as of a fibrous structure or appearance, in which there is, however, no possibility of detaching the apparent fibers from the general mass, or in which they are inflexible and brittle if detached: but a more perfect example of mineral F. is found in *amianthus*, a variety of asbestos (q.v.). For the scientific use of F. with regard to the animal kingdom, we refer to the article **MUSCLE**; for its scientific use with regard to the vegetable kingdom, to **VEGETABLE TISSUE** and to **WOOD AND WOODY FIBER**. In its more popular, but perfectly accurate use, it includes the hair or wool of quadrupeds, the silken threads of the cocoons of silk-worms and other insects, the fibers of the leaves and of the inner bark of plants, and the elongated cells or hairs connected with the seeds of plants, the ordinary materials of cordage and of textile fabrics.

Of mineral substances, amianthus alone has been used for textile fabrics, and that only to a very limited extent. Animal and vegetable fibers have, from the earliest ages, supplied man with cordage and with cloth. How the invention took place, can only be matter of conjecture.

The animal fibers used for textile purposes are chiefly of the two classes already mentioned—(1) the wool or hair of quadrupeds, and (2) the silk of the cocoons of insects. To these may be added (3) the byssus (q.v.) of mollusks, but this class contains only the byssus of the pinna (q.v.) of the Mediterranean, an article of ancient and high reputation, but more of curiosity than of use. The skins and intestines of animals, although sometimes twisted or plaited for various uses, can scarcely be reckoned among the

fibrous materials afforded by the animal kingdom. For information regarding the fibers obtained from the cocoons of insects, see **SILK AND SILKWORM**. It is to the first class that the greater number of different kinds of animal F. used for textile purposes belong; and the wool of the sheep far exceeds all the rest in importance. See **SHEEP** and **WOOL**. But the wool or hair of other quadrupeds is also to some extent used, as of the goat (see **GOAT** and **ANGORA**), the alpaca (q.v.), the camel (q.v.), the bison (q.v.), the musk ox (q.v.), the yak (q.v.), and the chinchilla (q.v.); all of which, except the last—and it has but a doubtful claim to be mentioned—are, like the sheep, ruminants. The hair of comparatively few animals is sufficiently long for textile purposes, or can be procured in sufficient abundance to make it of economic importance. The warmth of clothing depends much on the fineness of the hair, and on other characters in which wool particularly excels.

The useful vegetable fibers are far more numerous and various than the animal. They are obtained from plants of natural orders very different from each other; none of them, however, belonging to the class of acrogenous or cryptogamous plants. They are obtained also from different parts of plants. Those which are derived from exogenous plants are either the fibers of the inner bark (or bast, q.v.), as flax, hemp, etc., or hairs of the fruit, as cotton. The useful fibers of endogenous plants sometimes also belong to the fruit, as coir or cocoa-nut F., and the unimportant F. of cotton-grass. The spathe of some of the palms is sometimes also sufficiently fibrous and strong to be used for bags, etc., without separation of its fibers; the fibers of the interior of the stem of old cocoa-nut palms are sometimes used for coarse purposes; the fibrous character of the stems of the slender palms called rattans, of bulrushes, etc., fits them for wicker-work, for plaiting into chair-bottoms, and the like; the roots of the *agaves* (q.v.) yield fibers useful for various purposes; but generally, the more valuable fibers obtained from endogenous plants are those of their leaves, either of the leaf-stalks—as piassaba F. and gomuto or ejoo F., both produced by palms—or of the blade of the leaf, as pineapple F., pita flax, New Zealand flax, bowstring hemp, etc. The fibers of the leaves of endogens being parallel to each other, are easily obtained of sufficient length for economical purposes; whilst the reticulated fibers of the leaves of exogens, even if long enough, which is comparatively seldom the case, cannot be separated for use. The *bast* fibers of exogens, however, are often of sufficient length, and easily separable. Their separation is generally accomplished by steeping in water, or by frequent bedewing with water, so as to cause a partial rotting of the other parts of the bast and of the bark which covers it. But the fibers of endogens being in general discolored and injured by this process to a much greater degree than those of exogens, mere mechanical means are usually preferred for their separation, such as beating, passing between rollers, and scraping. The fibers of many leaves are separated by scraping alone. The fibers of *fruits*, as cotton, exist in nature in a separate state, like the wool or hair of animals, and require merely to be collected and cleaned.

A complete enumeration of the kinds of vegetable F. applied to economical purposes would not be easy. Flax, hemp, and cotton have long had the pre-eminence. To these have recently been added New Zealand flax, jute, sunn or sunn hemp, coir, pita flax, abaca or Manilla hemp, bowstring hemp, China grass, piassaba, and many others. New kinds are continually being brought under notice, and to this industrial exhibitions and industrial museums have most beneficially contributed. New kinds, however, do not immediately command the attention they deserve. "If a new product is sent into the market," says Dr. Royle, "few of the regular customers will buy it, as they want that to which their machinery and manufactures are suited." But for the judgment and enterprise of Mr. Salt, it might have been long ere alpaca wool had obtained its present place among the materials of our manufactures; and there is much reason to think that many vegetable fibers, now little regarded, may yet in like manner be exalted to importance.

For the use of vegetable fibers in the manufacture of paper, see **PAPER**.

FIBROUS PLANTS. Without attempting a complete enumeration of plants which yield fibers employed for economical purposes, we give the following as a list which may be useful. Many of the subjects will be found treated in separate articles, or more fully noticed under the natural orders. The most important are indicated by capitals.

I. EXOGENOUS PLANTS.

1. *Fibers of the Fruit.*

- Nat. ord. *Malvaceæ*. COTTON, produced by species of *Gossypium*.
 ————— *Sterculiaceæ*. Silk-cotton, or vegetable silk, the produce of *Bombax villosum*, etc.
 ————— *Asclepiadaceæ*. The silk-like down of the seeds of Virginian silk (*Asclepias Syriaca*).

2. *Fibers of the Inner Bark or Bast.*

- *Malvaceæ*. Decane hemp (*Hibiscus cannabinus*).—Other species of *Hibiscus*, *Althæa cannabina*, *Sida abutilon*, etc.
 ————— *Sterculiaceæ*. A number of species of different genera; some of them cultivated to a small extent.

Nat. ord. *Tiliaceæ*. JUTE (*Corchorus olitorius*, *C. capsularis*, etc.).—The bast of some trees of this family, as the linden or lime (*Tilia Europæa*, etc.), is used for mats, ropes, etc. See BAST.

———— *Linaceæ*. FLAX, the produce of *Linum usitatissimum*.

———— *Leguminosæ*.—SUNN, Jubbulpore hemp, etc., the produce of species of *Crotalaria*.

Spanish broom (*Spartium junceum*).

Bokhara clover (*Melilotus arborea*).

Dhunchee (*Sesbania aculeata*).

Species of *Cytisus* (as common broom), butea, *Parkinsonia*, *Bauhinia*, etc.

———— *Asclepiadaceæ*. Jetee (*Marsdenia tenacissima*).

Yercum or mudar (species of *Calotropis*).

Virginian silk (*Asclepias Syriaca*, *A. debilis*).

Other species of several genera.

———— *Apocynaceæ*. Canadian hemp (*Apocynum cannabinum*).

———— *Urticææ*. Common nettle (*Urtica dioica*) and other species of *Urtica*.

Species of *Behmeria*, one of them yielding CHINA GRASS fiber.

———— *Cannabinaceæ*. HEMP (*Cannabis sativa*).

Hop (*Humulus lupulus*).

———— *Moraceæ*. The bark of some species of fig.

———— *Coniferaæ*. Inner bark and roots of some species of pine and fir.

———— Unknown. Buaze.

II. ENDOGENOUS PLANTS.

Nat. ord. *Liliaceæ*.

NEW ZEALAND FLAX, fiber of leaves of *Phormium tenax*.

Bowstring hemp, fiber of leaves of species of *Sansevieria*.

Fiber of leaves of species of *Aloë* and of *Yucca*.

———— *Amarylhidææ*. Pita flax, fiber of leaves of *Agave Americana*.

Fiber of leaves of species of fourcroya.

———— *Musaceæ*. Abaca or Manilla hemp, and plantain fiber, obtained from leaves of species of *Musa*.

———— *Bromeliaceæ*. Pine-apple fiber, curratow, etc., fibers of leaves of species of *Bromelia*, etc.

———— *Pandanaceæ*. Fibers of leaves of screw-pines.

———— *Palmaceæ*. COIR or cocoa-nut fiber, from husk of cocoa-nut. Fiber of cocoa-nut stem. Gomuto or ejoo fiber, from leaf stalks of gomuto palm (*Arenga saccharifera*).

Piassaba, from *Attalea funifera* and *Leopoldinia Piassaba* (the Chiquichiqui palm).

Other fibers from leaf-stalks, etc., of many palms.

———— *Cyperaceæ*. Fiber from leaves of *Eriophorum cannabinum* (see COTTON-GRASS). Mats, chair-bottoms, etc., made of different *Cyperaceæ*.

———— *Gramineæ* or grasses. Esparto (*Stipa tenacissima*).

Moonja (*Saccharum munja*).

FIBRINE is an organic compound, occurring both in animals and plants. In its chemical composition it closely resembles albumen and caseine, and it was until recently believed that these three substances possessed a common radical, to which the name *proteine* (from *proteno*, I am first) was given, the *proteine* being regarded as the primary basis of all the tissues of the body. Hence we frequently find F. described as one of the *proteine* bodies.

F. is mainly distinguished from the allied substances, albumen and caseine, by its separation in a solid state, in the form of extremely delicate filaments or lamellæ, from any fluid in which it is dissolved, very shortly after the abstraction of the latter from the organism.

Animal F., which is of the greatest physiological importance, occurs principally in the blood, the lymph, and the chyle. In order to obtain it in a state of purity, we beat or stir the blood with a bundle of twigs, to which the F. adheres in strings. The impure F. thus obtained is then rinsed with water, boiled with alcohol and ether—to remove fatty matters—and dried. In healthy venous blood, it scarcely ever amounts to 3 in 1000 parts, its average quantity being 2.3. Small, however, as its amount is, it varies more than any other constituent of the blood, and in acute inflammatory diseases sometimes exceeds its average by 5 or 6 times. Moreover, arterial blood contains more F. than venous blood. In the lymph and chyle, it occurs in considerably less quantity than in the blood. In inflammatory exudations, we find F. in the contents of the serous cavities—as, for example, of the pleura and peritoneum—and on the mucous membrane (as in croup); in these cases, it usually occurs in a state of spontaneous coagulation.

There are good physiological reasons for believing that F. is formed from albumen, and not directly from the food; and as F. contains a little more oxygen than albumen, it has been inferred that it is formed from the latter by a process of oxidation. As, however, more F. is found in the blood in pneumonia—when a considerable portion of

the lungs is rendered impervious to air—than in almost any other disease, we are inclined to adopt the opposite hypothesis, that the augmentation of the F. in inflammatory blood is caused by an insufficient supply of oxygen. When oxygen is abundantly introduced into the blood, the F. rapidly undergoes further transformation. on the other hand, when, in consequence of impeded respiration, the quantity of oxygen conveyed to the blood is not sufficient to effect the further normal oxidation or transformation of the F., we have an accumulation of that constituent in the circulating fluid.

It has, however, been a disputed question, whether F. is produced in the elaboration or in the disintegration of the tissues. For the discussion of this subject, and of the other points connected with F., we must refer to Lehmann's *Physiological Chemistry*, vol. i. pp. 361–364.

The substance forming the mass of flesh or muscular tissue was formerly regarded as identical with coagulated blood-fibrine. The two substances are, however, chemically distinct, and the muscle-fibrine will be described under its new chemical name, **SYNTONINE** (from *suntein*, to contract or render tense).

FICHTE, IMMANUEL HERMANN, son of Johann Gottlieb, and professor of philosophy in the university of Tübingen, was b. in 1797, and early devoted himself to philosophical studies, being attracted by the later views of his father, which he considered were essentially *theistic*. He also attended the lectures of Hegel, but felt averse to his pantheistic tendencies, and leaned more to Schleiermacher and Schelling. Occupied at first as a teacher, F. was appointed professor of philosophy in Bonn in 1836, and from 1842 to 1863 held a chair in the university of Tübingen. His chief works are *Beiträge zur Charakteristik der neuern Philosophie* (1841); *Grundzüge zum Systeme der Philosophie* (1839–47); *System der Ethik* (1850); *Anthropologie* (1856); *Psychologie* (1864); *Vermischte Schriften* (1869); etc. He suggested meetings of philosophers similar to those held by physicists; and at the one held at Gotha, 1847, he delivered an address *On the Philosophy of the Future* (Stuttg. 1847). The great aim of his speculations has been to find a philosophic basis for the personality of God, and for his theory on this subject he had proposed the term *concrete theism*, to distinguish it alike from the abstract theism which makes God almost an unreality—a barren aggregate of lifeless attributes; and on the other hand, from the all-absorbing pantheism of Hegel, which swallows up the human and the divine in its own inapprehensible totality. Some time ago, F. published an important work, *Zur Seelenfrage, eine Philosophische Confession*, which has been translated into English by J. D. Morell, under the title of *Contributions to Mental Philosophy* (1860), for an account of which see art. **CONSCIOUSNESS**. During the movements of 1848, he issued several political tracts. The principle of F.'s politics is not unlike Dr. Arnold's maxim. He holds that there is only one kind of real conservatism, that of constant well-planned reform; and that all revolution consists either in attempts to precipitate prematurely the future, or to go back to ideas that are effete, the last being only the chrysalis form of the first. The state, “according to the idea of benevolence,” belongs to the future. The regeneration of Christianity would consist in its becoming the vital and organizing power in the state, instead of being occupied solely, as heretofore, with the salvation of individuals. To this recent school of philosophy belong Weiss, Chalybeus, Wirth, and others. He d. 1879.

FICHTE, JOHANN GOTTLIEB, an illustrious German philosopher, was b. at Rammenau, in upper Lusatia, 19th May, 1762. His earliest years were marked by a love of solitary musing and meditation. When a mere child, he was wont to wander forth to upland fields, that he might enjoy the pleasure of gazing into the illimitable distance. In 1775, he was placed at the gymnasium of Pforta, near Naumberg; and in 1780 he entered the university of Jena, where he devoted himself at first to theology, but afterwards to philosophy. During the years 1784 to 1788, he supported himself in a precarious way as tutor in various Saxon families. Subsequently, he went to Zurich in a similar capacity, where he made the acquaintance of the excellent lady who afterwards became his wife, Johanna Maria Rahn. In 1791, F. obtained a tutorship at Warsaw, in the house of a Polish nobleman. The situation, however, proved disagreeable, and was thrown up by the fastidious philosopher, who next proceeded to Königsberg, where he had an interview with Kant, of whom he had become an ardent disciple. Here he wrote, in 1792, his *Kritik aller Offenbarung* (Critique of all Revelation), which he showed to that philosopher, who praised it highly, but still maintained a certain air of reserve towards the enthusiastically earnest author, which pained the latter greatly. At Königsberg, F. was reduced to such straits for want of the means of subsistence, that he was forced to ask the loan of a small sum of money from Kant, which the latter was stoical enough to refuse. Things were now at the worst with F., and of course—according to the old adage—they began to mend. He entered the delightful family of the count of Krokow, near Danzig, as tutor, was enabled to marry; and in 1794, was appointed to the chair of philosophy at Jena, where he commenced to expound with extraordinary zeal his system of transcendental idealism. F., in fact, preached his philosophy as if he believed its reception essential to the salvation of his hearers. In 1795, he published his *Wissenschaftslehre* (Doctrine of Science), in which he clearly broke away from Kant, whose speculations did not seem to him sufficiently thorough, or, as Eng

lishmen would say, *idealistic*. Indeed, as early as 1793, writing to Niethammer, he says: "My conviction is, that Kant has only indicated the truth, but neither unfolded nor proved it." An accusation of atheism, which F. fervidly but fruitlessly refuted, cost him his chair in 1799. In the previous year, he published his *System der Sittenlehre* (System of Ethics, Jena, 1798), considered by many to be his most mature work. He now removed to Berlin, where he delivered lectures on philosophy to a select auditory. In 1800, appeared his *Ueber die Bestimmung des Menschen* (On the Destiny of Man). In 1805, he obtained the chair of philosophy at Erlangen, with the privilege of residing at Berlin in the winter. Here he delivered his celebrated lectures *Ueber das Wesen des Gelehrten* (On the Nature of the Scholar, Berlin, 1805-1806). In the same year appeared his *Grundzüge des gegenwärtigen Zeitalters* (Characteristics of the Present Age); and in 1806, his *Anweisung zum seligen Leben oder die Religionslehre* (The Way to the Blessed Life, or the Doctrine of Religion). But F. was a patriot as well as a philosopher. The victories of Napoleon at Auerstadt and Jena drew forth the famous *Reden an die Deutschen* (Addresses to the Germans). These addresses were full of the most exalted enthusiasm. F. "laments that his age has denied him the privilege accorded to Æschylus and Cervantes, to make good his words by manly deeds." The Prussian king appreciated the zeal of the eloquent metaphysician, and, on the restoration of peace, requested him to draw up a new constitution for the Berlin university. In 1810, the university was opened, with a host of brilliant names, F., Wolff, Müller, Humboldt, De Wette, Schleiermacher, Neander, Klaproth, and Savigny. By the votes of his colleagues, F. was unanimously elected rector. Here, as at Jena, he labored with unremitting energy for the suppression of all those customs which he deemed barbarous in themselves, and incompatible with the true idea of a scholar. In 1813, the war of independence broke out, and the hospitals of the Prussian capital were soon crowded with patients. F.'s wife was one of the first who offered her services as a nurse. For five months, she tended the sick with all the patient tenderness and devotion of her nature. At last, she was seized with fever, 3d Jan., 1814. After a fearful struggle, she recovered; but her husband caught the infection, and in spite of all remedies, sank under its influence, and died 27th Jan., 1814. It is difficult to speak calmly of Fichte. His life stirs one like a trumpet. He combines the penetration of a philosopher with the fire of a prophet, and the thunder of an orator; and over all his life lies the beauty of a stainless purity. See *Fichte's Leben und literarischer Briefwechsel* (published by I. H. Fichte, 2 vols. Sulzb. 1830-31); and W. Smith's *Memoir*, published by Chapman and Hall (Lond. 1848). The fundamental notion of the idealism set forth in F.'s writings, at least in the earlier of them, is the sole reality of the *Ego* or I, which posits both itself and the *Non-ego*, or not-I. (The phrase "to posit," it ought to be observed here, signifies in German metaphysics, to present to the consciousness. Hence, when it is said that the *ego* posits itself, the meaning is, that the *ego* becomes a fact of consciousness, which it can only become through the antithesis of the *non-ego*.) Under this *ego*, however, must not be understood, according to the usual misapprehension, the human and finite, but the "absolute subject-objectivity" (*absolute subject objectivität*) the eternal, universal reason. The *ego* is the absolutely productive, which, however, would not attain to consciousness of itself—i.e., of its infinite spontaneous activity, did it not at the same time place in contrast to itself, and as an impediment (*anstoß*) and limit to its activity, the *non-ego*—i.e., the objective world, or nature. The *ego*, in so far as it is determined by the *non-ego*, is the intelligent *ego*, and, as such, the subject of theoretical science; the *ego*, on the other hand, as determining the *non-ego*, is the subject of practical science. Freedom, absolute, spontaneous activity, for its own sake, is not with F., as with Kant, the condition and pre-supposition of moral action, but is itself the highest expression of the problem of the moral law. To realize this self-activity, however, the *ego* requires an external world of objects, in order that in them as limits it may become conscious of its own activity. To this idealistic system of ethics it has been plausibly—some think unanswerably—objected that it makes the *non-ego* be required as the condition of morality, and at the same time represents the removal of this condition as the aim of moral effort. With respect to the idea of right, F.'s theory of freedom, in its fundamental principles, attached itself to the Kantian theory of freedom as the innate and primitive principle of right. Generally speaking, F. makes that which, from the stand-point of ordinary consciousness, we call the world, merely a product of the *ego*; it exists only through the *ego*, for the *ego*, and in the *ego*. F. himself afterwards modified or extended his system, so as to bring out more prominently the *theistic* character of his metaphysics. The transition to this later stage of F.'s philosophy is seen in his *Bestimmung des Menschen* (Destination of Man). It arose from the intense religiosity of his nature. F. was essentially a worshipping nature, and though he never ceased to be a philosopher, the untiring aspiration of his later years was to realize in his own way the belief of the great Jewish lawgiver: "The eternal God is thy refuge, and round thee are the everlasting arms." A popular exposition of his philosophy is given in his *Anweisung zum seligen Leben*. It is set forth in a strictly scientific manner in the lectures published in the *Nachgelassene Werke*, edited by I. G. Fichte (3 vols. Bonn, 1834-35), in which his *Speculative Logik* and his revised theory of right and morals are particularly deserving of attention. Although F. never, strictly speaking, formed a school, and though his system has only been adopted by a few, such as J. B. Shad, Mehmel,

Cramer, Schmidt, and Michaelis, his influence upon the subsequent development of German philosophy has been very important. F.'s collective works have likewise been published by his son, I. H. Fichte. His popular works have been translated into English by W. Smith, and published by J. Chapman of London in his "Catholic Series." Their titles are: *The Destination of Man*; *The Vocation of the Scholar*; *The Nature of the Scholar*; *The Way to the Blessed Life*; and *The Characteristics of the Present Age*.

FICINO, MARSILIO, an illustrious philosopher of the Italian platonic school, was b. at Florence 1433. He was the son of the principal physician of Cosmo de' Medici; and to the liberality of this prince he owed the classical culture which inspired his future career. At the suggestion of Cosmo, F. undertook the translation of Plotinus, Iamblichus, Proclus, and Porphyry, besides a Latin but by no means literal version of Plato. In 1463, he was appointed by Cosmo president of a classical society or academy, founded in 1440, having for its aim the diffusion of the Platonic doctrines, which F. held to be the basis and confirmation of the Christian system. On the death of Cosmo, F. found a no less munificent patron in this prince's grandson, Lorenzo de Medici; and having, at the mature age of 40, decided on entering the church, he was endowed by Lorenzo with the rectorship of two churches in Florence, and a canonry in the cathedral. His theological doctrine, while undoubtedly sincere, presents a strange medley of incongruous views, the natural result of his attempt to fuse the philosophy of Plato with the Christian creed. He died in 1499, and was interred in the cathedral of Florence, where a monument commemorates his upright and manly qualities no less than his learning and philosophy. F.'s collected works were published at Basel (2 vols. f., 1491).

FICK, AUGUST, an eminent philologist, was born at Petershagen, near Minden, Germany, in 1833, studied under Benfey at Göttingen from 1852 to 1856, and next acted as a teacher in the gymnasium there until his appointment in 1876 to an extraordinary professorship of comparative philology in the university. His greatest work is his great *Vergleichendes Wörterbuch der Indogermanischen Sprachen* (3 ed., 1874-75), a stupendous monument of learning, though its value is somewhat impaired by the audacity of its reconstruction of the primitive parent-speech. Other works are *Die Griechischen Personennamen* (1874), *Die ehemalige Sprachenheit der Indogermanen Europas* (1875), and *Die Homerische Ilias, in der ursprünglichen Sprachform wiederhergestellt* (vol I., 1885).

FICTION. See NOVELS.

FICTION OF LAW has been defined to be "a supposition of law that a thing is true, which is either certainly not true, or at least is as probably false as true."—Erskine, *Inst.* iv. 2, 38. Fictions have existed in all legal systems. They must be regarded as a species of legal fraud, which has been tolerated as enabling individuals who, by the strict letter of the law, would have been excluded from obtaining redress of evils, to procure that remedy by a pious fraud. There are two general maxims which regulate the application of fictions—viz., that no fiction shall be allowed to operate a wrong, and that no fiction shall be admitted which in the nature of things is impossible. The Roman form of judicial procedure abounded with fictions, by which alone, in many cases, a party aggrieved could enforce his right. Thus, an heir, unjustly disinherited, by the *querela inofficiosi testamenti*, feigned that his father had been mad. A stranger in Rome, who had been robbed, could not obtain restitution without the *fictio civitatis*, whereby he feigned himself a citizen. Many of the fictions existing in Rome have found a counterpart in modern systems; thus, the *fictio longæ manus*, whereby lands at a distance were feigned to be delivered, resembles an English feoffment at law. In like manner, the *fictio traditionis symbolica* of keys of a warehouse to give possession of the articles contained therein, and of a deed in confirmation of the covenants contained therein. The *fictio unitatis personarum* was the original of the Scottish fiction, that the heir is *eadem persona cum defuncto*. But in no system of law have fictions been so liberally adopted as in that of England. It is by means of fictions alone that the original limited jurisdiction of the courts of Queen's bench and exchequer has been extended to ordinary suits. In the latter court, every plaintiff assumed that he was a debtor to the crown, and was debarred from discharging his obligation by the failure of the defendant to satisfy his demand; in the former, it was assumed that the defendant had been arrested for some supposed trespass which he had never in fact committed. The fictitious character of John Doe and Richard Roe long contributed to make the action of ejectment famous. And though these fictions have disappeared before the ruthless hand of modern legislation, yet to this day, in an action at the instance of a father for the seduction of his daughter, damages can only be awarded on the assumption that she was his servant, and that he has suffered pecuniary loss by deprivation of her services. In chancery, again, the whole doctrine of uses and trusts is based upon a fiction. Perhaps the best explanation of the introduction of fictions into legal systems is to be found in Dr. Colquhoun's *Summary of the Roman Civil Law*, 2027. It involves, he says, "less difficulty to adhere to known and admitted forms, and gradually to accommodate them to the changed state of society, than to upset all the incidents connected with them by a sudden change, which must ever tend to unsettle the law and practice of the courts. All nations have therefore found it more desirable to let the one glide into the other, than to adopt any abrupt measure which might disturb the practice and effect of former decisions."

In the law of Scotland, fictions of law are not of frequent occurrence. For the benefit of creditors, the principle that the heir is *eadem personæ cum defuncto* is admitted; and in an action of "reduction-improbation" of a deed, it is assumed that the document was false, whether the fact be so or not. But in general the legal system of Scotland has shown a facility of adapting itself to the circumstances of the case, and that without producing the alarming results which presented themselves to the imagination of Dr. Colquhoun.

FICUS. See FIG.

FID (from the Lat. *findere, fidi*, to divide), for splicing ropes, is a large pointed pin, with an eye at the thick end, of iron or lignum vitæ, used by sailors in separating and interlacing the strands of which the rope is composed.

A *mast-fid* is a bolt inserted through the bottom of a ship's topmast or top-gallant-mast, with ends resting on the trestle-trees sustained by the head of the lower mast or topmast. Unless the mast-fid be withdrawn, the supported mast cannot be lowered.

FIDDEMIN, one of the handsomest villages of the Fayûm, inhabited by a Mussulman and Coptic population. It is surrounded by fruit-trees, and is remarkable for a large olive, supposed to be the original one planted in Egypt, and yielding annually 268 lbs. of olives.—Clot Bey, *Aperçu générale sur l'Égypte* (8vo, Paris, 1840), vol. i. p. 213.

FIDDLE. See VIOLIN.

FIDDLER'S GREEN, a name given by sailors to their dance-houses and other places of amusement on shore—a sort of nautical paradise.

FIDEICOMMISSUM, in the civil law, was a conveyance of property in trust to be transferred to a third person named by the truster. *Fideicommissa*, when first introduced, were not supported by the law. The performance of them depended, therefore, on the conscience of the party intrusted, and they were consequently frequently not carried out. They were originally adopted for the purpose of conveying property either where a party, from the circumstances of the case, as inability to procure the proper number of witnesses, was prevented from executing a will; or where he desired to benefit those who, by law, were precluded from taking the property. To effect this purpose, an actual conveyance was made to a friend, coupled with a request that the property should be transferred to another. *Fideicommissa* having thus been introduced for a special purpose, were by degrees extended to conveyances of the whole inheritance, and finally were used for the purpose of settling estates in a particular order of succession, forming the earliest instance of entails (q.v.). *Fideicommissa* first received the sanction of positive law in the reign of Augustus, by whom authority was given to the prætor to enforce the performance of these fiduciary obligations.—*Institutes*, ii. 23, s. 1. The emperor Claudius subsequently extended this authority to the consuls and presidents of provinces. *Fideicommissa* were either *particular* or *universal*, the former being a bequest of a particular subject, or a part only of the inheritance; the latter comprehended the whole estate.

In *Holland*, the principles of the civil law as to *fideicommissa* form an important branch of the law in regard to landed estates. An heir may be required to transfer either the whole or a portion of his inheritance. The provisions of the *senatus-consultum trebellianum* also have been adopted; but if an heir resist the intentions of the testator, and is compelled by law to execute the trust, he is not allowed to take the benefit of these provisions. The benefit also may be excluded by express direction in the will. Children who have received their legal portions, and are required to transfer to a stranger the rest of the inheritance, are entitled to retain a fourth part for themselves. Grotius, *Dutch Jurisprudence*, by Herbert, b. ii. c. 20.

FIDE CULA, a small musical instrument in the shape of a lyre.

FIDEI DEFENSOR (Lat., *defender of the Faith*). See DEFENDER OF THE FAITH.

FIDENÆ was an old and important city situated on the south bank of the Tiber, about five miles above Rome, and supposed to have been founded by the Etruscans. It is said that no other city played as important a part in the history of early Rome as did this city. As early as the days of Romulus ill-will, with frequent strife, existed between the two cities, and continued, with short intervals of peace, until 496 B.C., when the Fidenates were forced to surrender. In 438 B.C. they revolted again, killing the Roman ambassador, and they were not subjugated until 426 B.C., when their city was taken, and they were sold into slavery. During the republic and the empire, it was only a small country village, remarkable chiefly for a terrible calamity which occurred during the first century B.C., when about 50,000 persons were killed by the fall of an amphitheatre during a gladiatorial contest. No ruins of Fidenæ exist.

FIDUS ACHATES. See ACHATES.

FIEF. See FEUDAL SYSTEM.

FIELD. In heraldry, the field is the whole surface or continent of the escutcheon or shield. It is so called, according to some, because it represents the field of battle on which the achievements or charges represented on it are supposed to have been gained. In blazoning, the tincture or metal of the field must be the first thing mentioned.

FIELD, CYRUS WEST, born at Stockbridge, Mass., 1819; son of David Dudley, D.D. He left his home at the age of 15 to enter a mercantile house in New York, and a few years later was the head of a prosperous concern. Retiring from business in 1853, he traveled for seven months in South America with Mr. Frederic E. Church, the artist, and on his return was applied to for aid in building a telegraph line in Newfoundland—an undertaking which had been begun, but had proved a total failure. The plan was to carry the line across that island to St. John's, the furthest point on the American coast, and there connect with a line of fast steamers, which, it was thought, could reach the nearest point in Ireland in five days. Thus America could be brought easily within a week of Europe. While Mr. Field was considering this proposal, and turning over the globe in his library, the thought flashed upon him, "Why not carry the line across the ocean?" In this was the germ of that project of an Atlantic telegraph to which he was to devote the next 13 years of his life. Having obtained, in 1854, from the legislature of Newfoundland, the exclusive right for 50 years of landing telegraph cables from Europe and America on the island, he formed a company known as the "New York, Newfoundland, and London Telegraph Company." In 1856, he went to London and organized the "Atlantic Telegraph Company." Mr. Field furnished one fourth of the capital, and the United States and British governments provided ships for the undertaking. The expeditions of 1857, the two of 1858, and those of 1865 and 1866 were mainly due to his efforts of organization, for although the first two were failures, and the cable laid by the third worked but four weeks, he never lost faith in the enterprise. In 1866, however, a cable was finally laid, and the cable of 1865 was picked up in mid-ocean by the Great Eastern, joined to the cable on board, and the western terminus was safely landed.

The success was complete, and in both countries honors were showered upon the leaders of the expedition. In England several were knighted, and others made baronets; and the prime minister, in conferring these rewards, said that the only reason why Mr. Field was not included in them was that it was felt that any title or dignity might not be acceptable to an American citizen. But he had honors enough at home. Besides innumerable congratulations, he received the unanimous thanks of congress, with a gold medal, and other testimonials for what was recognized as one of the most remarkable achievements of the century. The French exposition of 1867 awarded him the grand medal, its highest award, given only to those who were recognized as great public benefactors.

Subsequently, while enjoying the fruits of his chief work, he was never idle in other directions, but took much interest in the different submarine cables in the Mediterranean and in the east, and also continually devoted much of his thought and of his capital to the establishment in New York of the system of elevated railroads, which have supplied a want long felt, and proved an inestimable blessing to the city. He had still one more dream of his life, to lay a telegraphic cable across the Pacific, and thus complete the circuit of the globe. He died in 1892. See ATLANTIC TELEGRAPH.

FIELD, DAVID DUDLEY, D.D., 1781-1867; born in East Guilford, now Madison, Conn.; graduated from Yale college in 1802; studied for the Congregational ministry, and in 1804 was settled at Haddam, on the Connecticut river; in 1818, was called to Stockbridge, Mass.; in 1837, he was recalled to his old parish in Connecticut, where he spent the last fourteen years of his active ministry. In 1851, having reached the age of seventy, he returned once more to Stockbridge, and there passed the evening of his life, greatly respected as one of the most venerable ministers of New England. He was the author of several local histories, such as that of Middlesex co., Conn., and of the city of Middletown; of Berkshire co., Mass., and of the town of Pittsfield; and of a genealogy of the Brainerd family. He also published a number of sermons.

FIELD, DAVID DUDLEY, B., Haddam, Conn., 1805; an eminent lawyer; son of David Dudley, D.D. He graduated at Williams college in 1825, studied law, and was admitted to the bar in 1828. He commenced practice in New York, where he has been a conspicuous figure at the bar for more than fifty years. Besides a very large professional practice, he devoted all the time which he could spare from pressing engagements for forty years to the reform of the law. He began the movement by writing articles in reviews and papers and pamphlets, showing the urgent necessity of reconstructing the modes of legal procedure. Having been appointed in 1847 a commissioner on practice and pleadings by the legislature of New York, he devoted himself first to the preparation of a code of civil procedure. The design of the new system of civil procedure was to wipe out the distinction between the forms of action, and between legal and equitable remedies, in order that all the rights of the parties in relation to the subjects of litigation could be decided in a single action, instead of dividing them, as formerly, between different suits. This system has been adopted in 24 states and territories, and has been substantially followed by Great Britain and many of her dependencies. The same commission framed a code of criminal procedure, which has been adopted by 15 states and territories. In 1837, Mr. Field was placed at the head of a new commission to prepare a political code, a penal code, and a civil code, which were finished and reported, but have not been adopted by the state of New York, though the civil and penal codes were passed by the two houses, almost unanimously, in 1879, and failed only for want of the governor's

signature. They have been of great service, however, in the legislation of other states, especially in California, where they were adopted with a few alterations that were necessary in order to adapt them to the condition of that state. In 1866, the British association for the promotion of social science held a meeting at Manchester, at which Mr. Field made a proposal for a general revision and reform of the law of nations, similar to that aimed at in his labors for the reform of the civil and criminal law. Acting on his proposal, he completed, in 1873, a work entitled *Outlines of an International Code*, which he presented to the social science congress of that year. It met with very favorable criticism from eminent jurists all over the world.

In 1873, he was elected first president of an association for the reform and codification of the law of nations, formed at Brussels in that year. This association has for one of its great objects the substitution of arbitration for war in the settlement of disputes between nations. He died in 1894.

FIELD, EUGENE, was born in St. Louis, Mo., Sept. 2, 1850. Some years of his early life were spent in Massachusetts and Vermont, though he finished his education at the State University in Columbia, Mo. At the age of twenty-three he entered the ranks of journalism, and was connected with several newspapers in Missouri and Colorado until 1883, where he joined the staff of the Chicago *Daily News*, with which he was long connected. He was a writer of both prose and poetry, and so witty and entertaining is his style, that he acquired the sobriquet of "the Chicago humorist," while many of his poems abound in delicate fancies and fine pathos. His published works are *Denver Tribune Primer* (1882); *Culture's Garden* (1887); *A Little Book of Western Verse* (1889); and *A Little Book of Profitable Tales* (1890); *Echoes from a Sabine Farm*, an amusing paraphrase of some of Horace's best-known lyrics, at first privately printed and then regularly issued (1895). He died in 1895, and since his death there has appeared an unfinished story, *The House* (1896).

FIELD, HENRY MARTYN, D.D., b. Stockbridge, Mass., 1822; son of David Dudley, D.D. After graduating from Williams college, he studied theology, and was ordained pastor of a Presbyterian church in St. Louis in 1842. He resigned this position in 1847 to go abroad, and spent a year in Europe. 1848 was the year of revolutions. He was in Paris during the three days of Feb. when Louis Philippe was overthrown, and wrote a very full description of the scenes of which he was an eye-witness. On his return he published also a sketch of the Italian revolutions, and a letter from Rome on *The Good and the Bad in the Roman Catholic Church*. At this time he wrote *The Irish Confederates: a History of the Rebellion of 1798*. In 1851, he was settled as pastor of a Congregational church in West Springfield, Mass., and in 1854 removed to New York, to become one of the editors of *The Evangelist*, a well-known religious journal, of which he is now sole proprietor. After making a second tour in Europe in 1858, he published *Summer Pictures: from Copenhagen to Venice*; and in 1866, he issued *The History of the Atlantic Telegraph*. In 1867, he was a delegate to the Free church of Scotland and the Presbyterian church of Ireland, and visited the great French exposition. In 1875-76, he spent a year and a quarter in a tour around the world, which furnished the material for two volumes, *From the Lakes of Killarney to the Golden Horn*, and *From Egypt to Japan*. He has also written *On the Desert* (1883); *Among the Holy Hills* (1884); *Our Western Archipelago* (1895).

FIELD, JOSEPH M., 1810-56; actor and dramatist, b. England, but for many years a resident of New Orleans, where he produced a number of plays. He was widely known as "Straws," a humorous writer on the *New Orleans Picayune*, and later as an editor in St. Louis. He was the father of Kate Field, the actress and lecturer. He published *The Drama in Pokerville*.

FIELD, KATE, b. St. Louis, daughter of Joseph M. She was educated in Massachusetts and in England, and at an early age became known as a correspondent for American newspapers and a writer for magazines. In 1874 she appeared on the stage in New York as "Peg Woffington," but with indifferent success. She was more successful as a lecturer. Miss Field has passed most of her time abroad, where she has been received with much honor. In 1880 she became active in establishing in New York a co-operative dry-goods store, and was for a time its head. This enterprise failed, and in 1889 she started a paper entitled *Kate Field's Washington*. She d. in 1896.

FIELD, STEPHEN JOHNSON, b. Haddam, Conn., 1816; son of David Dudley, D.D. At the age of 13 he made a voyage to the east in company with a brother-in-law, who was a missionary, and he spent three years in Smyrna and Athens, studying Greek and other languages. Returning to this country, he graduated at Williams college, in 1837, with the highest honors. He then studied law in the office of his brother in New York, and, after his admission to the bar, became his partner until 1848, when he went abroad and passed a year in Europe. On his return, in 1849, he joined in the emigration then just beginning to California, settled at a place where now stands the city of Marysville, and was elected the first alcalde, holding the office until the organization of the judiciary under the constitution of the state. Under Mexican law an alcalde had a very limited jurisdiction; but after the American occupation the jurisdiction exercised by him in the anomalous condition of society in California at that time was practically unlimited. In 1850, he was elected to the legislature, and was placed on the

judiciary committee. He drew up a bill defining the powers of the courts of justice and judicial officers of the state, which was passed, and most of its provisions are still retained in the code. He secured also the passage of a law giving effect to the usages and regulations adopted by the miners for the protection and working of the mines. The principle embodied in this law was adopted in other mining regions of the country, and finally by the congress of the United States. In 1857, he was elected judge of the supreme court of California, and in 1859 he succeeded David S. Terry as chief-justice. When Mr. Field came to the bench, the titles to lands in the state were unsettled, and it is principally by decisions in which he delivered the opinions of the court that the law of real property in California has been placed on a permanent basis. He was appointed in 1863, by President Lincoln, an associate justice of the supreme court of the United States, which position he still holds. The opinions of the court in the celebrated test-oath cases, written by him, and his dissenting opinion in the legal-tender cases, attracted general attention. In 1869, he was appointed professor of law in the university of California; in 1873, as one of a commission to examine the codes of the state, he prepared amendments which were adopted by the legislature. He was a member of the famous electoral commission of 1876 which decided the presidency in favor of Rutherford B. Hayes; and voted with the minority in favor of Samuel J. Tilden. His opinions in the Virginia jury cases, and the cases arising under the election laws of congress, have been the subject of much discussion throughout the country.

FIELD OF THE CLOTH OF GOLD, a plain near Guisnes, in the department of Calais, France, where Henry VIII. of England and Francis I. of France held a conference in June, 1520. The throne of France was sought for by Charles I. of Spain (afterwards Charles V.), and Francis sought the friendship of the English king. To bring about such a result Francis proposed to raise cardinal Wolsey to the papacy. Wolsey brought about and conducted the meeting, which was attended with so much splendor of pageantry as to give the peculiar title to the place. In the opening of *Henry VIII.* Shakespeare gives the following vivid description of the event:

Buckingham. An untimely ague
Stay'd me a prisoner in my chamber when
Those sons of glory, those two lights of men,
Met in the vale of Andren.

Norfolk. 'Twixt Guynes and Arde:
I was then present, saw them salute on horseback;
Beheld them, when they lighted, how they clung
In their embracement, as they grew together;
Which had they, what four throned ones could have weigh'd
Such a compounded one?

Buckingham. All the whole time
I was my chamber's prisoner.

Norfolk. Then you lost
The view of earthly glory: men might say,
Till this time pomp was single, but now married
To one above itself. Each following day
Became the next day's master, till the last
Made former wonders its. To-day the French,
All clinquant, all in gold, like heathen gods,
Shone down the English: and, to-morrow, they
Made Britain India: every man that stood
Show'd like a mine. Their dwarfish pages were
As cherubims, all gilt: the madams too,
Not used to toil, did almost sweat to bear
The pride upon them, that their very labor
Was to them as a painting: now this masque
Was cried incomparable; and the ensuing night
Made it a fool and beggar. The two kings,
Equal in lustre, were now best, now worst,
As presence did present them; him in eye,
Still him in praise: and, being present both,
'Twas said they saw but one; and no discernor
Durst wag his tongue in censure. When these suns—
For so they phrase 'em—by their heralds challenged
The noble spirits to arms, they did perform
Beyond thought's compass; that former fabulous story,
Being now seen possible enough, got credit,
That Bevis was believed.

The solemnities occupied nearly three weeks. Ten days were spent in the feats of arms for which Wolsey had provided. There were tilting with lances, and tournaments on horseback with the broadsword, and fighting on foot at the barriers. The kings were always victorious against all comers. On midsummer day the gaudy shows were over.

FIELD OF FORCE OF MAGNETS. The region of magnetic influence surrounding the poles of a magnet. Magnetic attraction and repulsion is assumed to take place along certain lines called lines of force. The direction of these lines in any plane may be shown by sprinkling iron filings on a sheet of paper held horizontally above a magnet and then tapping the paper. The iron filings will assume the position of the lines of force in the plane of the paper. Every line of force is thus shown to be a closed circuit having an equal force in every part of its length, and the number of lines of force within the magnet is the same as those outside.

FIELDFARE, *Turdus pilaris*, a species of thrush (q.v.), in size about equal to the blackbird, but with greater length of wing; the general color gray, the feathers tipped with a brownish black elongated spot; the throat and breast reddish yellow, streaked and spotted with black; the forepart of the back and wings of a rich brown color; the tail slightly forked and nearly black; the under parts white. The F. is a very common winter visitant of Britain, although it rarely breeds even in the northern parts of the island. It arrives from more northern regions when the winter has fully come, and departs again towards the end of spring. It is well known to youthful sportsmen, and affords much employment for their guns during the Christmas holidays, when it may generally be found in small flocks—often along with its smaller congener, the redwing—in fields, if the weather is mild, feeding on worms, snails, etc., or, in severe weather, about hedges, thickets, and woods, wherever haws and other such fruits or seeds are abundant. Its winter migrations extend southward as far at least as the islands of the Mediterranean. It is one of the summer songsters of the n. of Europe and of Siberia; its song is soft and melodious, but is much less familiar to us in Britain than its call-note, which is harsh. It is extremely plentiful in Norway, where its nests are very generally built in spruce firs, and, contrary to the ordinary habits of thrushes, in society; numerous nests being often to be found in the same tree, and “two hundred nests or more being frequently seen within a very small space.” The F. is easily tamed, and sings well in captivity.

FIELD-GLASS is the lens usually interposed between the object-glass and eye-glass of a microscope, which, receiving the diverging rays from the former before they form an image, contracts the dimensions of the image, and increases its brightness, so as to render it of a proper size and degree of distinctness for being viewed by means of the eye-glass. See **FIELD OF VIEW**, and **MICROSCOPE**.

FIELDING, ANTHONY VANDYKE COPLEY, an English painter in water-colors, was b. about 1787, and began to exhibit in 1810. For many years he held the office of president of the society of painters in water-colors, and was generally recognized as the representative of that branch of art in England. He died at Worthing, in Sussex, Mar. 3, 1855, in his 68th year, and after a career of steady prosperity. Possessing remarkable mechanical dexterity and knowledge of effect, F. painted with what severe critics would call fatal facility. He contributed about a score of pictures annually to the exhibition of the water-color society. But, to do him justice, he always exhibited a certain easy finish of treatment, which was perhaps of itself a kind of secondary talent. Although his range of subjects was but limited, yet within it he was almost unrivalled. As a painter of marine effects, and of the landscapes of down and glade, it is thought by many that he has had as yet no equal.

FIELDING, HENRY, b. April 22, 1707, was the son of Gen. Edmund Fielding, connected with the earls of Denbigh. He was sent to Eton, and was afterwards transferred to the university of Leyden, to prosecute legal studies. Returning to London, he began to write for the stage, and worked with so much industry that between 1727 and 1736, he produced nearly a score of comedies and farces, which were forgotten with nearly as much speed as they were produced. He married in 1736, and falling heir to a small estate, he, with his young wife, retired from London. But his was not a Fortunatus's purse, and his hand was continually in it; and in three years after his marriage, he was back in London a student at the temple. He was called to the bar at the usual time, but gout intervening, steady practice was rendered impossible. Happily, a way of escape was at hand. Richardson published *Pamela*; the town was ringing with it; and F., whose strong, healthy, unconventional nature revolted from the moral priggishness of “*Virtue Rewarded*,” resolved to write a counterpart, purporting to be the adventures of Pamela's brother, *Joseph Andrews*. This work, begun in a satirical mood, and intended merely to quiz Richardson, deepened as it proceeded, and flowered out into humorous adventure. The exquisite character of Parson Adams took the world by surprise, and remains one of the permanent glories of English fiction. The next important work undertaken by him was *Jonathan Wild*, a masterpiece of irony, which has never been sufficiently appreciated, and which doubtless suggested to Mr. Thackeray the scope and conduct of *Barry Lyndon*. The rebellion of 1745 induced F. to undertake the direction of the *Jacobite Journal*, in support of the Hanoverian succession; and shortly after, as a reward for his loyalty, he was, through the influence of lord Lyttelton, promoted to a pension, and to the place of justice of the peace of Middlesex and Westminster. While engaged in magisterial duties, he produced *Tom Jones*, his most famous fiction, which the world has never ceased to read, nor critics to admire. His next work was *Amelia*—less striking and masterly than its predecessor, but quieter in style, and enriched with scenes of domestic tenderness. Shortly after its publication, he was attacked by dropsy, jaundice, and asthma, a complication of disorders which baffled the skill of the physicians. Seeking relief, he left England for Lisbon on the 26th June, 1754, and died there on the 8th Oct. of the same year, at the early age of forty-seven.

F. was the first great English novelist, and he remains to this day one of the greatest. *Tom Jones* is a miracle of invention, character, and wit. It contains the most amusing scenes and adventures, the most sparkling delineations of life, high and low, the most

abundant satire. Everywhere, the author's manliness, shrewd sense, and scorn of meanness and hypocrisy, are apparent. If defects may be hinted, it may be said that F.'s nature was more robust than delicate; that it was deficient in the sentimental and poetic side; and, as a consequence, that his ideal of woman is not high, and his descriptions of the tender passion either commonplace or extravagantly rapturous. The love-scenes between Tom and Sophia, and the episode of the "Man of the Hill," which is meant to be passionate and poetic, are perhaps the only portions of the great novel which readers skip. It is to be regretted that all F.'s works are disfigured by coarseness of circumstance and expression; but that was the fault of the time as much as of the man. He was coarse; he wore ruffles, drank claret, and hated the Pretender. He set himself to paint society as he saw it, and we must forgive the coarseness for the truthfulness of the picture. See Austin Dobson's biography (1889).

FIELD-MARSHAL, the highest rank of general officers in the British and other foreign armies. In the former, it is a special honor enjoyed by very few officers, and only conferred by selection, either on the ground of distinguished service or of royal birth. When unemployed, the field-marshal has no higher pay than any other gen., but if commanding an army, he receives £16 8s. 9d. a day for staff-pay, while a gen. has but £9 9s. 6d. The equivalent rank in the navy is that of admiral of the fleet. Formerly, a capt.gen. was occasionally appointed, who had rank higher even than a field-marshal.

FIELD-MOUSE, a name popularly given to certain species both of MOUSE and of VOLE. See these articles.

FIELD-OFFICERS, in the army, are such as are competent to command whole battalions—viz., majs., lieut.cols., cols.—in contradistinction to those merely intrusted with company duties, as capts., lieuts., and sublieuts.

FIELD OF VIEW is the whole space within which objects can be seen through an optical instrument; more strictly, it is the space within which the image of an object may be seen by whole pencils. That part of the image which is seen by partial pencils of the light from the object speculum or lens is called the *ragged edge*, and usually a diaphragm is employed to cut it off from the view of the observer altogether.

FIELDS, JAMES THOMAS, b. N. H., 1817; educated in a high school in Portsmouth, and became a clerk in a book-store in Boston. In his 18th year, he read the anniversary poem before the Boston mercantile library association, on which occasion Edward Everett delivered the oration. In 1848, before the same society, he delivered another poem, *The Post of Honor*, Daniel Webster being the orator. He is widely known as a member of the successive publishing houses of Ticknor, Reed, and Fields; Ticknor and Fields; and Fields, Osgood, and Co.; for 25 years, to 1871. He collected and issued De Quincey's works in 21 volumes. In 1849, 1854, and 1858, respectively, he printed volumes of his poems for private distribution. He edited *The Atlantic Monthly* from 1862 to July, 1870; made repeated visits to Europe, and had wide acquaintance with literary men abroad. Mr. Fields lectured in the United States, and published *Yesterdays with Authors*, in which are many anecdotes of literary men. He d., Boston, 1881.

FIELD-TRAIN, a department of the royal artillery, consisting of commissaries and conductors of stores, responsible for the safe custody of the ammunition, for the formation of proper depots of shot, etc., between the front and the base of operations, and that a due proportion shall be constantly at the service of each gun during an engagement.

FIELD-WORKS are intrenchments and other temporary fortifications thrown up by an army in the field, either as a protection from the onslaught of a hostile force, or to cover an attack upon some stronghold. Field-works will be more particularly described under the article fortifications (q.v.).

FIERDING COURT (Fierding Thing), a district court in use among the early Gothic nations. This court was established for the purpose of rendering speedy justice in small matters. There were four of these courts in every hundred, each presided over by a separate judge, whose jurisdiction extended to all causes where the matter in dispute did not exceed the sum of three marks.

FIERI FACIAS, WRIT OF, an English writ for enforcing the judgment of a court of law against the goods of a debtor. It may be sued out as soon as final judgment has been signed, or, in case of a trial out of term, in fourteen days after verdict, unless, on special cause shown, a judge order speedy execution. But a writ of F. F. cannot be enforced after a *capias ad satisfaciendum* (q.v.) has been issued. The sheriff, in executing this writ, may not break open doors; but having obtained peaceable entrance, he may break open inner doors, cupboards, and trunks. The officer in execution having taken possession, may leave an assistant in charge, by whom an inventory of the goods is made. He is entitled to remain on the premises a reasonable time in order to remove the goods; but if he continue longer without permission of the owner, he is liable to an action for trespass. By 8 Anne, c. 14, if goods are removed from land or premises let on lease, the party removing them must pay the rent and taxes. A creditor may not take, in execution, manure, hay, etc., where, by the covenants of the lease, the tenant

is prohibited from removing them (56 Geo. III. c. 50). Growing crops, if seized in execution, and sold, are liable for rent accruing after the date of the seizure, as long as they remain on the ground (14 and 15 Vict. c. 25). By 1 and 2 Vict. c. 110, money, bank notes, bills of exchange, and other securities, may be taken under a writ of *fieri facias*. By 8 and 9 Vict. c. 127, a creditor is not entitled to take wearing-apparel and bedding or tools where the value of the whole does not exceed £5. Such fixtures as belong to the heir, and not to the executor, cannot be taken under this writ. The goods of the party only who is named in the writ may be seized; and if the officer take goods belonging to a stranger, he is liable to an action for damages. By 1 and 2 Vict. c. 110, decrees in chancery have the effect of a judgment in a court of law. In Scotland, the corresponding process for seizing and selling a debtor's goods is a warrant to poind the movables. See **POINDING**.

Fieri facias de bonis ecclesiasticis is a writ directed to the bishop of the diocese, requiring him to attach the ecclesiastical goods of a clergyman within his diocese, in satisfaction of the judgment of a court of law.

FIESCHI, Count GIOVANNI LUIGI, a member of one of the most illustrious houses of Genoa, was b. about the year 1523. In addition to the luster of ancestral fame, his name has attained a tragic historical celebrity in connection with a remarkable conspiracy of which he was the chief. Andrea Doria, a famous admiral, sprung from a race hereditarily at feud with that of F., having expelled the forces of Francis I. from the state, had restored the republican form of government, but at the same time, by his vigorous administration, effectually held in check the ambition of the nobles. Count F. organized a plot, having for its object the death of Doria, and his nephew Gianettino, the object of F.'s special hatred, and the establishment of an oligarchic form of government. Instigated by the approval of France and Rome, and supported by an alliance with the duke of Parma, F. speedily enrolled a formidable array of accomplices, his three brothers among the foremost. Crowds of his own feudal retainers were secretly armed and assembled from the various hereditary lands of the house; three galleys, purchased with the connivance of the pope, were fully equipped; and all being in readiness, the attempt was fixed for the 2d of Jan., 1547. Doria, in spite of repeated warnings, refused to ascribe treacherous or subversive designs to F., whom he regarded as a fast friend and partisan. Complete success seemed at first to crown the conspirators; the gates of the city were forced, the fleet captured, Gianettino assassinated, Doria in flight. F. had but to appear and dictate, but he was nowhere to be found; and the strangest episode of this wild drama is the sudden disappearance of its hero. In stepping from one galley to the other in the darkness of night, F. stumbled, and falling overboard, was borne down by his ponderous armor, and miserably drowned in the harbor, or, according to some, stifled in the slime.

FIESCHI, GIUSEPPE MARIA, known by his attempt on the life of king Louis Philippe, was b. in Corsica in the year 1790. His early life contains nothing of note. A profligate career appears to have reduced him to great poverty about the year 1835, when he conceived the idea of assassinating the king. The immediate cause of his diabolical design was the suppression of a situation which he held, by order of the prefect of the Seine. Disguising his crime under the cloak of political enthusiasm, he leagued with himself one or two obscure persons, of pot-house politics, who hated the government of the citizen king. These were Pierre Morey, a saddler; Pepin, a grocer; and Victor Boireau, a maker of lamps. F. sketched the plan of an infernal machine with twenty barrels, that could be simultaneously discharged; got one made, and placed it in a house of the Boulevard-du-Temple. The review of the national guard held there, 28th July, 1835, afforded F. the opportunity he desired. On the approach of the king and queen, he fired his machine. Eighteen people were killed, among whom was marshal Mortier, who fell dead beside his sovereign. Louis Philippe, however, himself escaped with a mere scratch, and was able to continue the review. F. was immediately seized, and along with his accomplices, was tried, condemned, and executed, 16th Feb., 1836.

FIE SOLE (anciently, *Fesulæ*), one of the most ancient Etruscan cities, is situated on the crest of a hill, at about three miles' distance from Florence, of which it may be said to be the parent city. From the heights of F., the view presented by Florence and the neighboring valleys is gorgeous in the extreme. We find F. first mentioned in 225 B.C. during the great Gaulish war. Hannibal encamped here after crossing the Apennines. The city was next destroyed by Sulla in the social war (90-89 B.C.), who afterwards despatched thither a military colony. At the invasion of Tuscany by the Goths, F. also fell under their dominion, and being by nature and art a formidable stronghold, was numerously garrisoned by the barbarians. The growth of Florence during the middle ages gradually reduced it to insignificance. It is now a place of about 2,500 inhabitants. The only vestige of Etruscan structures still remaining is the cyclopean city wall, constructed of huge blocks of stone, many portions of which are wonderfully perfect. The site of the Etruscan fortress is now occupied by a convent, and interesting fragments of the foundations are often brought to light. The amphitheater and other remains belong to the Roman age. The very ancient church of St. Alexander, supposed to have originally served as a pagan temple, contains an altar dedicated to

Bacchus, the inscription of which is, however, illegible, owing to a fissure in the middle. Coins and other relics have been repeatedly dug up.

FIESOLE, *FRA GIOVANNI DA*, one of the most eminent regenerators of Italian art, also known by the title of *Fra Angelico* or *Il beato Angelico*, was b. at Vecchio in Mugello in 1387. In 1407 he entered the Dominican order, and consecrated his artistic abilities exclusively to sacred aims, illustrating various works of devotion with beautiful miniature designs. These early artistic efforts are remarkable for their rich effects of coloring, gorgeous illumination, and exquisite elaboration of the most minute ornamental details. Having achieved a high reputation as fresco-painter by some noble compositions with which he endowed his own and other convents, he was commissioned by Cosmo de' Medici, with the decoration of the church of Santa Annunziata and the convent San Marco. Each cell of the convent was adorned with a fine fresco of large dimensions, and amidst other paintings, one can still distinguish F.'s "Annunciation." The fame of this work induced Pope Nicholas V. to summon him to Rome, and intrust him with the execution of a series of illustrations taken from the life of St. Laurence, destined to embellish the private chapel of St. Laurence in the Vatican. See Giangiocomo Romano, *Le Pitture della Cappella di Nicolò V.*, etc. (Rome, 1810). So rigid a disciplinarian was F., that no private or public work was ever undertaken without the formal consent of his superiors being obtained, and to them all pecuniary remuneration was transferred. The archbishopric of Florence, spontaneously offered him by the pope, was humbly declined. He died in Rome in 1455. The gallery of Florence possesses several pictures of F., still undimmed in brilliancy of coloring. One of these, the "Birth of John the Baptist," is a conception full of simple and winning grace. Some of the largest easel-compositions of this artist at present adorn the gallery of the Louvre; among those in the antechamber are the "Coronation of the Virgin," and the "Miracles of St. Dominico." One supreme aim pervades all the creations of F.—that of arousing lofty devotional feeling through the contemplation of the beautiful in art.

FIFE, an ancient wind-instrument of military music, in which the melody is produced by blowing through a hole in a reed or tube, while the escape of air is regulated by the fingers stopping or opening a number of other holes in different parts of the pipe. It has a compass of two octaves, from D on the fourth line of the treble clef to D above in altissimo. The fife figures in the sculptured memorials of the Argonautic expedition, and from that time to this has maintained its place as a simple yet effective instrument for martial purposes. It was common with English troops till the reign of James I., but was then discontinued; to be re-introduced by the duke of Cumberland at the siege of Maestricht in 1747. It is a universal favorite in the navy, and many a stirring air on drums and fifes has cheered the sailor to deeds of daring.

FIFE, **ALEXANDER WILLIAM GEORGE DUFF**, first duke of, was born in 1849 and was the sixth earl of Fife, but was created first duke of Fife in 1889, on his marriage with the Princess Louise of Wales (b. 1867). The children born from this marriage stand next in the line of succession to the English throne after the heir of Prince George, the duke of York.

FIFE-NESS, a promontory of Scotland, the eastmost point of Fifeshire, in lat 56° 17 n., and long. 2° 35' west. On the n., in the sea, are the dangerous Carr rocks, with an iron beacon 35 ft. high, which required six years to construct. F. is in view of the Isle of May and Bell Rock lights. In the Ness, trap rocks jut through the carboniferous strata, and the rocks contain small caves.

FIFESHIRE, a maritime, almost peninsular co. of the e. of Scotland, between the Firth of Forth on the s. and the Firth of Tay on the north. It is 44 m. in extreme length from n.e. to s.w., and 18 at its greatest breadth; area, 492 sq.m.; coast-line, 85 m., mostly rocky, and having many small ports. The surface is a succession of cultivated vales and hills. The hills rise in the west Lomond, 1713 ft., and Largo Law, 948. The chief rivers are the Tay, Forth, Eden (20 m. long), and Leven (12). F. rests on old red sandstone, with trap rocks in the n., and carboniferous strata, with trap, in the south. There are many coal and iron mines, and lime quarries. The climate is dry, healthy, and mild on the Forth; but the valleys in the n. are much exposed to the full sweep of the e. and n.e. gales. The soil is a rich loam, or wet clay on till. The Howe of Fife, on the Eden, is mostly sandy and gravelly, and not very productive. F. has a greater number of proprietors, gentlemen's seats, and plantations, in proportion to its size, than any other Scotch county, and its coasts are thickly studded with towns and villages. The chief manufactures are linen, floor-cloth, and malt liquors. Pop. '91, 190,365. It contains the two parliamentary divisions of East and West Fife. The chief towns are Cupar (the county town), Dunfermline, St. Andrews, Kirkcaldy, East and West Anstruther, Burntisland, Crail, and Dysart. The ancient "kingdom of Fife" was the most cultivated, as well as the most warlike, of Scotch counties. It contains striking monastic, feudal, and palatial ruins at St. Andrews, Dunfermline, Falkland, and Lindores; many Celtic and Roman remains. Many of the events connected with the Scottish reformation took place in this county, especially at St. Andrews.

FIFTEENTH, a stop in English organs tuned two octaves above the diapasons, the lowest C pipe of which is two ft. long.

FIFTH MONARCHY MEN. Among the strange and whimsical forms of opinion which the religious and political fermentation of the 17th c. brought to the surface of society, and embodied in the shape of religious sects, were those of the Fifth Monarchy Men. The date which has been assigned to their first appearance is 1654. Notwithstanding the ridicule with which they have often been overwhelmed, there seems nothing in their tenets more objectionable than we find in those of many of the other sects of the period, and there is no reason to believe that the practices of their leaders exceeded in absurdity, or equaled in impiety, those of Robbins, Reeve, Muggleton, and other apostles of the Ranters. In common with most persons who hold the literal interpretation of prophecy, they believed in the four great monarchies of Antichrist marked out by the prophet Daniel; and quite consistently with Christian orthodoxy, they added to them a *fifth*—viz., the kingdom of Christ on earth. So far, there was nothing peculiar in their views. But their error was twofold. 1st. They believed in the immediate, or at least in the proximate, advent of Christ (a tenet which was common to them with the early church); and 2d. They held that the fulfillment of God's promise to this effect must be realized by the forcible destruction of the kingdom of Antichrist. Every obstacle which opposed itself to the setting up the Messiah's throne was to be thrown down, and what these obstacles were was a question for the solution of which the only criterion which presented itself was their own fanatical prejudices and hatreds. It is obvious that such doctrines in such times must have given rise to practical as well as speculative disorder. The Fifth Monarchy Men became extinct as a sect shortly after the restoration; a fact which, by depriving them of exponents of their own body, may have exposed them to misrepresentation (Marsden's *History of the Later Puritans*, p. 387). In politics, the Fifth Monarchy Men were republicans of the extremest section; and when their conspiracy to murder the Protector, and revolutionize the government, was discovered in 1657, their leaders, Venner, Grey, Hopkins, etc., were imprisoned in the Gate house till after the Protector's death. Amongst their arms and ammunition which was seized, was found a standard exhibiting a lion couchant, supposed to represent the lion of the tribe of Judah, with the motto, "Who will rouse him up?"—Neal's *Puritans*, vol. iv. p. 186. See also Carlyle's *Cromwell's Letters and Speeches*, vol. iii. p. 31.

FIG, *Ficus*, a genus of trees and shrubs belonging to the natural order *moraceæ*, and distinguished by having the flowers—male and female mixed—within an almost closed top-shaped fleshy receptacle, which enlarges to form the fruit, and incloses numerous one-seeded carpels, imbedded in its pulp. There are more than 100 species, some of them very large trees. Almost all belong to tropical and sub-tropical countries, of the vegetation of which they often form a most important feature. They abound in India, in every jungle and hilly situation, to the most northern Himalaya, and some of them are cultivated about every village. Both *F. religiosa* (the peepul) and *F. Rumphii* are held in veneration by the Hindus. The most notable species are the common *F.*; the banyan (q.v.); the peepul (q.v.), bo tree or sacred *F.* of India; the sycamore (q.v.); and the East Indian india-rubber (q.v.) tree. The leaves of some species are entire, those of others are lobed. Several species of *F.* exhibit the character for which the banyan in particular has become celebrated, of sending roots straight down to the ground from their spreading branches, and thus multiplying the apparent stems, by which a vast canopy of branches and foliage is supported. The East Indian caoutchouc or india-rubber tree is remarkable for the exposure of its roots, which appear in masses above ground, extending on all sides from the base like great writhing snakes. Some figs are creeping or trailing shrubs, with slender stems, covering heaps of stones, or ascending trees like ivy.—Besides the common *F.*, many species yield edible fruits, although none of them are nearly equal to it in value. Amongst them are the peepul (*F. religiosa*), *F. Benjamina*, *F. pumila*, *F. auriculata*, *F. Rumphii*, *F. Bengalensis*, *F. aspera*, *F. racemosa*, and *F. granatum*, all East Indian, also the sycamore of Egypt.—The milky juice of some species is bland and abundant, as of *F. Saurureana*, which has therefore been ranked among cow-trees. In other species, the milky juice is very acrid. That of the common *F.* produces a burning sensation on the tongue. That of *F. toxicaria*, a native of the Malayan islands, is used for poisoning arrows.—Lac (q.v.) is gathered from some species.—The leaves of *F. politoria* are so rough that they are used for polishing wood and ivory in India. The juice of the fruit of *F. tinctoria* is used in Tahiti to dye cloth; the color is at first green, but being acted on by the juice of a *cordia*, it becomes bright red. The bark supplies cordage, of which fishing-nets are made.

The COMMON *F.* (*ficus carica*) is a native of the east, as the specific name *carica* (from *caria*) imports; but it is now cultivated throughout the whole of the s. of Europe, and is even found naturalized there. Its cultivation has also extended to many warm countries. In North America, it is seldom to be seen further n. than Philadelphia; and it is not sufficiently hardy to be a common fruit tree in Britain, although even in Scotland figs may occasionally be seen ripened on a wall; and in the s. of England fig-trees are sometimes grown as standards, and a few small *F.* orchards exist. Protection is always given in some way during winter. Near Paris, and in

some other parts of the continent of Europe, fig-trees are so trained that the branches can be tied in bundles and laid along the ground, when they are covered with litter and earth. The F. is a low deciduous tree or shrub, with large deeply lobed leaves, which are rough above, and downy beneath. The branches are clothed with short hairs, and the bark is greenish. The fruit is produced singly in the axils of the leaves, is pear-shaped, and has a very short stalk; the color in some varieties is bluish-black; in others, red, purple, yellow, green, or white. The varieties in cultivation are numerous. In warm climates, the F. yields two crops in the year—one from the older wood (midsummer shoots of the preceding year), and a second from the young wood (spring shoots of the same year); but in colder regions the latter never comes to perfection. Fig-trees are propagated by seed, by suckers, etc.; very frequently by layers or by cuttings. In America, they are often to be seen in hothouses, and grow well in pots. Dried figs form an important article of food in the Levant; in more northern regions they are used for dessert, or for medicinal purposes, being applied to gumbolls and other sores, and also administered in pulmonary and nephritic affections, and to relieve habitual constipation. The pulp contains about 62 per cent of a kind of sugar called *sugar of figs*. Figs are either dried in the sun or in ovens built for the purpose. Great quantities are annually imported into America from the Mediterranean. The best are mostly brought from Smyrna, and are known as *Turkey figs*, of which those called *Eleme* or *Elemi* are most highly esteemed. Figs of inferior quality are imported in considerable quantities in the form of *fig-cake*, pressed along with almonds into cakes somewhat like small cheeses. In the Levant, Portugal, and the Canaries, a spirit is distilled from fermented figs. See *illus.*, TREES, ETC., vol. XIV.

FIG'ARO, a dramatic character introduced on the Parisian stage in 1785 by Beaumarchais (q.v.) in his *Barbier de Seville* and his *Mariage de Figaro*. These plays, in which F., who coolly outwits every one, is first a barber and then a valet-de-chambre, secured for their author a brilliant reputation not only in France, but also in Germany, where many translations and adaptations of the pieces appeared. Mozart, Paesello, and Rossini also made them the basis of classic operas. Since their publication, the character of F. has stood as a type of cunning, intrigue, and dexterity. After the restoration of the Bourbons, a Parisian journal, distinguished for its satirical talent, assumed the name.

FIGEAC, a t. of France, in the department of Lot, is situated in a valley surrounded by finely wooded hills on the right bank of the Sellé, 32 m. e.n.e. of Cahors. It is irregular, its streets are narrow, and badly planned, and its houses in general not well built, but the antiquity and quaintness of many of its buildings give it a picturesque and interesting appearance. It has two beautiful Gothic churches, one of them, that of St. Sauveur, has a choir of the 11th, a general superstructure of the 15th, and a modern front of the 19th century. F. owes its origin to a Benedictine monastery, founded by Pepin in 755 A.D. It has some cotton manufactures, and a trade in wine and cattle. Pop. '91, 6680.

FIGHTING FISH, *Macropodus pugnax* or *Ctenops pugnax*, a small fresh-water fish, of the family *anabasidæ* (q.v.), a native of the s.e. of Asia, and particularly of Siam, where it is very commonly kept as gold-fishes are in Britain, but on account of its pugnacity. Two of these creatures when brought together, often rush immediately to combat, or it is even enough to introduce a looking-glass into the water, and the fish hastens to attack its own image. Fish-fights are a favorite amusement of the Siamese; the license to exhibit them yields a considerable annual revenue; and an extraordinary amount of gambling takes place in connection with them; not merely money and property, but children and liberty being sometimes staked. The F. F. has the anal and dorsal fins prolonged into tapering points. When the fish is quiet, its colors are dull; but when it is excited, they glow with metallic splendor, and "the projected gill-membrane, waving like a black frill around the throat, adds something of grotesqueness to the general appearance."

FIGLINÉ, or **FIGHINE**, a t. of central Italy, in the province of Florence, and 15 m. s.e. from Florence, on the left bank of the Arno. It is surrounded by a rectangular wall, and is traversed by a fine street, through which passes the great road from Florence up the valley of the Arno. The silk of F. is the best in Tuscany. Pop. about 9800.

FIGUEIRA, a t. of Portugal, in the province of Beira, at the mouth of the Mondego, 23 m. w. by s. from Coimbra. Its harbor is a small bay or estuary of the Mondego, and is safe, but difficult of access, particularly for large vessels. It carries on, however, a considerable trade. The chief exports are salt, wine, vinegar, oil, dried fruits, and oranges. The wine shipped from F. is known in England by the names of *Figueira* and *Bairrada wine*. It is quite different both from port and from sherry. It is best when new, and does not bear keeping long. F. is much resorted to as a bathing place. Pop. about 5000.

FIGUERAS, a t. in the n.e. of Spain, is situated near the French frontier, in the province of Gerona in a fruitful district, 20 m. n.n.e. of the town of Gerona. Its streets are gloomy, but it has beautiful promenades. On a height near the town is the citadel of S. Fernando, one of the strongest fortresses of Spain, and the key of the Pyrenees on

their s. side. This fortress has been so frequently taken by the French as to give rise to the remark, common enough among the Spaniards, that the citadel of S. Fernando in time of peace belongs to Spain, but in time of war to France. Pop. 12,600.

FIGUERA, ESTANISLAO, b. 1819; a Spanish statesman on the ultra-liberal side at first, but afterwards a supporter of Espartero. He was a member of the Cortes (national legislature) in 1851; and was re-elected in 1862. In 1866 he was complicated in the revolutionary movements, and was imprisoned by Narvaez. After the abdication of Isabella he was a judge and a member of the revolutionary committee. Again sent to the national legislature, he became a prominent leader of the republican party, and after the abdication of Amadeo in 1873, provisional president of the republic. He d. in 1882.

FIGUEROA, FRANCISCO DE, 1540-1620; a Spanish poet, called "the divine;" educated in the university, and served in the army. He wrote the first good Spanish blank verse.

FIGUIER, GUILLAUME LOUIS, b. 1819; a French chemist and scientific writer. He commenced the study of chemistry under his uncle, was made doctor of medicine in 1841, and in the following year went to Paris to continue his studies. In 1846, he was appointed professor of the school of pharmacy in Montpellier. Afterwards, however, he returned to Paris, and in 1855, became scientific editor of *La Presse*. His contributions to scientific journals are numerous. Among the most important are: *Exposition et Histoire des principales Découvertes Scientifiques Modernes*; *Histoire des Merveilleux dans les Temps Modernes*; and *Vies des Savants Illustres depuis l'Antiquité jusqu'au XIX Siècle*. *The Human Race*; *The Insect World*; *The World before the Deluge*, and several other popular works of this author have been translated into English. He d. in 1894.

FIGULINE. See POTTER'S CLAY.

FIGURANTES is the term applied in the ballet to those dancers that do not come forward alone, but dance in troops, and also serve to fill up the scene and form a background for the solo dancers.

FIGURATE NUMBERS. The nature of F. N. will be understood from the following table:

| | 1, | 2, | 3, | 4, | 5, | 6, | 7, etc. |
|------|----|----|------|-----|-----|------|-----------|
| I. | 1, | 3, | 6, | 10, | 15, | 21, | 28, etc. |
| II. | 1, | 4, | 10, | 20, | 35, | 56, | 84, etc. |
| III. | 1, | 5, | 15, | 35, | 70, | 126, | 210, etc. |
| | | | etc. | | | etc. | |

The natural numbers are here taken as the basis, and the first order of F. N. is formed from the series by successive additions; thus, the 5th number of the first order is the sum of the first five natural numbers. The second order is then formed from the first in the same way; and so on.

If instead of the series of natural numbers, whose difference is 1, we take series whose differences are 2, 3, 4, etc., we may form as many different sets of figurate numbers. Thus:

| | 1, | 3, | 5, | 7, | 9, etc. |
|------|----|------|-----|------|-----------|
| I. | 1, | 4, | 9, | 16, | 25, etc. |
| II. | 1, | 5, | 14, | 30, | 55, etc. |
| III. | 1, | 6, | 20, | 50, | 105, etc. |
| | | etc. | | etc. | |

Or—

| | 1, | 4, | 7, | 10, | 13, etc. |
|------|----|------|-----|------|-----------|
| I. | 1, | 5, | 12, | 22, | 35, etc. |
| II. | 1, | 6, | 18, | 40, | 75, etc. |
| III. | 1, | 7, | 25, | 63, | 140, etc. |
| | | etc. | | etc. | |

The name *figurate* is derived from the circumstance, that the simpler of them may be represented by arrangements of equally distant points, forming geometrical figures. The numbers belonging to the first order receives the general name of *polygonal*, and the special names of *triangular*, *square*, *pentagonal*, etc., according as the difference of the basis is 1, 2, 3, etc. Those of the second order are called *pyramidal* numbers, and according to the difference of the basis, are *triagonally*, *quadragonally*, or *pentagonally* pyramidal. The polygonal numbers may be represented by points on a surface; the pyramidal by piles of balls.

The general formula for polygonal numbers, from which any particular one may be found by substituting the proper values for n and r is,

$$\frac{(r-2)n^2 - (r-4)n}{2}$$

where n = number of the term required, r = the denomination (3 if triangular, 5 if pentagonal, etc.).

FIGURE, GRAMMATICAL. See SYNTAX, FIGURES OF.

FIGURE, RHETORICAL, an ideal characterization, or illustration, which may be affirmed by one mind and denied by another, or affirmed and denied by the same mind under different conditions. It is usually an exaltation or a depreciation of a person or thing; as "Shakespeare was divine" in appreciation; or, "Tompkins is a goose," in depreciation. In any case its expression is in metaphor. See **METAPHOR**.

FIGURED BASS, in music, is a bass part with figures placed over the notes, which indicate the harmony to be played to each note, and serves as a guide to the accompanist. Ludovico Viadana is said to have been the inventor of F. B. in the 17th century.

FIGURE-STONE. See **SEATITE**.

FIGWORT, of the order *scrophulariaceae*; a flowering plant indigenous to North America and Europe; once thought valuable as a remedy for scrofula.

FIIJI, FEEJEE, or VITI ISLANDS, an archipelago of over 200 islands in the southern Pacific ocean, situated in lat. 15° 30' to 20° 30' s., and long. 177° to 178° west. The group, which has a total area of 8,035 sq. m., almost equal to that of Wales, was discovered in 1646 by the Dutch navigator Tasman. The largest of the group, Viti-levu, or Big Viti, has an area of 4250 sq. m.; Vanua-levu, of 2,600 sq. m.; and all the other islands together, of 1185 sq. miles. The islands are of volcanic origin, and although there are no longer any active volcanoes, yet hot springs, numerous earthquakes, and other signs testify that the subterranean forces are not quite extinct. They are all coral-girt; and to the approaching navigator appear clothed to their very summits with a dense and luxuriant vegetation. The surface is generally hilly, and the soil, owing to the abundant rain, is very productive. The windward sides of the islands are covered with thick forests, while to the leeward we see a grassy country dotted here and there with screw-pines. The most important river is the Kailevu, in the island of Vanua-levu, navigable for 60 m. from its mouth; the others are comparatively insignificant. The climate is extremely fine, and the country is said to be exceedingly healthy. The mean annual temperature is about 80° F., and the heat is tempered by the trade and other winds. Hurricanes, though rarely, do sometimes occur. In 1866, two severe storms burst over the entire group, doing great damage to the plantations.

The natural productions of Fiji or Viti are of the most varied description, and the vegetation is, on the whole, of a tropical nature.

Sugar cane is cultivated, and considerable progress has been made in the manufacture of sugar. There are also tea factories, boat-building yards, and a tobacco factory, but the main industries of the colony are still agricultural. The plantations are numerous, and on them are raised, besides tobacco and sugar, cocoanuts, peanuts, fruit, and cotton, all of which are exported. The greater part of the trade is with the colonies of New Zealand, New South Wales, and Victoria, but there has been an increase in the export trade in fruit with the colony of New Caledonia. With Great Britain the direct trade is very small. The main article of food is the yam, by the ripening season of which the natives regulate their calendar. In other articles of vegetable diet, and especially in edible fruits, Fiji is remarkably rich. Among the latter may be mentioned bananas, plantains, the breadfruit, oranges, shaddockes, the guava, and pineapples. Timber of excellent quality abounds, suitable both for house and ship building. The animals in Fiji are not numerous, but there are considerable numbers of cattle reared, together with sheep, horses, mules, and Angora goats. Fish are numerous both in the seas and in the rivers. The export trade of the islands has not been commensurate with their vast natural wealth. Between 1891 and 1895 the total foreign trade fluctuated considerably, being £727,383 in 1891, rising to £867,633 in 1894, and falling to £573,968 in 1895. Sugar was the main article of exportation. The foreign trade is virtually confined to the British possessions.

The native inhabitants are for the most part Melanesians, with dark complexions and long woolly hair. They are strong-limbed, muscular men, but are generally reported to be averse to continued labor. At all events, the planters have had to look abroad for assistance in their fields, drawing largely from the New Hebrides and the Solomon islands. The government controls the introduction of these laborers and their treatment on the plantations. A considerable intermixture has taken place with the Polynesian Tonga islanders. Up till 1854 cannibalism was universal in the islands, but since that date it has been suppressed, or at least banished to the most remote districts, through the efforts of the missionaries. The greater part of the natives are professed Christians, and almost all have abandoned their idols. The Wesleyans, who first came in 1835, have made the most converts. The number of persons in regular attendance at the churches of the Wesleyan mission, in 1894, was 98,297, that is, the bulk of the population. The Roman Catholic priests, arriving in 1846, have also been successful. The number in attendance at the churches of the Roman Catholic mission, in 1894, was 9,700. Many of the missionary schools are taught by natives, the great majority of whom can read and write their own language. These schools are not supported by the state. They have been admirably administered, and by far the greater portion of the native children are in regular attendance at the schools of the Wesleyan mission. The government maintains an industrial and technical school, and contributes state aid to two public schools, one in Suva and one in Levuka.

The population of the colony in 1891 was given at 121,180. Estimates in earlier years showed a considerably larger population, but the estimate for Dec. 31st, 1894, showed a slight increase, namely 121,867. The ethnic elements in the population were

at that date, in the order of their importance, Fijians (103,750), Indians (9130), Europeans (2,666), Polynesians, Rotumans, and half-castes.

The later history of Viti has been very tumultuous, and to this fact is undoubtedly owing the small extent of its commerce. In 1855, Thakaumba, chief of Bau, was made responsible for a debt due from the natives to the Americans, and this resulted in his election to the dignity of "Tui Viti," or king of Viti. In 1857 he offered to cede Viti to Great Britain, in consideration of the payment of his debt to America, stipulating only for the retention of his title and authority over the natives. This offer, however, was refused by the British government in 1862, after sending out a deputation. A "Polynesian company" was then started, which undertook to clear off the debt, in return for certain valuable privileges, but ultimately it collapsed. In 1869 the president of the United States refused the protectorate of the islands. From that date until 1873, the government sanctioned three or four unsuccessful constitutions. The cession of the islands to Britain was renewed in 1873, and accepted, and on Sept. 30, 1874, they were annexed as a crown colony. The governor is appointed by the crown and is aided by an executive council of three members. The law-making body is a legislative council under the presidency of the governor, having six official members and six unofficial members nominated by the crown. There is no military force, but an army of native constabulary is maintained. Local government is left largely in the hands of the chiefs, the colony being divided into 16 provinces, 12 of which are under the administration of native officials. Many native chiefs are also employed by the government in subordinate administrative offices, and there are many native magistrates. See works on Fiji, by Horne (1881), Gordon Cumming (1882), *Colonial Government Handbook of Fiji* (1892). See illus., NEW CALEDONIA, ETC., Vol. X.

FILANGIERI, GAËTANO, 1752-88; an Italian writer on public polity. His *Scienza della Legislazione* appeared in 1780, and had great success. But this and earlier writings fell under the censure of the papal church, and were condemned by the congregation of the Index. His works have had much influence on European thought.

FILARIA. See GUINEA-WORM and THREAD-WORMS.

FILBERT. See HAZEL.

FILDES, SAMUEL LUKE, painter, was b. in 1844, a native of Lancashire, England. He studied in the South Kensington Schools and in the Royal Academy, and became known as a woodcut designer, contributing to *Once-a-Week*, *Cornhill*, and *The Graphic*, and illustrating Dickens's *Edwin Drood*. He began to exhibit in the Royal Academy in 1868, with his "Nightfall;" and in 1874 he produced a very popular picture "Applicants for Admission to a Casual Ward," originally a *Graphic* woodcut, followed in 1877 by the powerful and pathetic "Widower." His more recent subjects have been portraits and figure pictures of Venetian life, in which he has developed a stronger color-sense than his earlier works gave any indication of. He was elected an A.R.A. in 1879, and an R.A. in 1887.

FILE (Fr. *file*, a row, Lat. *filum*, Ital. *fila*, *filo*), in a military sense, is used to signify any line of men standing directly behind each other, as *rank* refers to men standing beside one another. In ordinary formations of the present day, a battalion stands two deep, or in two ranks—front and rear—wherefore a file consists of two men. Sometimes, however, the battalion may be formed much more solidly, as in a square, when the file comprises a far larger number. The number of files in a company describes its width, as the number of ranks does its depth. thus, 100 men in "fours deep" would be spoken of as 25 files in 4 ranks.

FILE—FILING. A file is a steel tool, having its surface covered with teeth or serratures, and used for cutting down and shaping metals and other hard substances. There is little doubt that in the earlier stages of metal-working, when bronze implements first superseded those of stone, rough stones were used for the purposes to which files are now applied; nevertheless, the use of files dates from high antiquity. They are mentioned in the Old Testament in the first book of Samuel, xiii. 21, also in the *Odyssey*.

Files are made of almost every conceivable shape, to suit the very varied purposes to which they are applied—flat, square, round or *rat-tail*, triangular, half-round, feather-edged, etc., besides being variously bent, in order to get at intricate work. Nearly all these files are made thicker in the middle, or "bellied," the object of which will be explained under **FILING**.

Files require to be made of the very best steel, which is first forged into the required shape, and is then called a "blank." The blanks are then finished more accurately to the required form by grinding, planing, or filing.

The blanks thus prepared and well softened (see **TEMPERING**) are next handed to the cutter, who sits astride on a low bench or stool, and has before him a stone anvil, with a flat piece of pewter laid upon it. The blank is held upon the anvil, with its tang towards the cutter, by means of a long loop of leather-strap, into which the cutter places his foot. He then cuts the teeth by striking with a hammer a short stout chisel, held obliquely at an angle of about 12° or 14° from the perpendicular. The object of this will be easily understood; for, if the chisel were perpendicular, a furrow like the letter V would be indented, and an equal burr struck up on each side; but, instead of this, a cutting tooth like that of a saw, but with less obliquity, is required; this is effected by the obliquity of the chisel, and a burr is thrown up on one side only—viz., towards the tang.

The astonishing regularity observable in the distance between the teeth is secured in

this way: The cutting is commenced at the point of the file; the chisel is then drawn backwards, laid upon the blank, and slid forwards till it reaches the burr raised by the last cut; the blow is now struck, and another tooth and burr produced, which serves as a guide for the next cut; and so on. The distance between the teeth thus depends on the force of the blow, and the obliquity of the cut; for the heavier the blow, the greater the ridge or burr, and the obliquity determines the distance of the cut from the burr; the skill of the workman consists, therefore, in the precise regulation of the blows.

Most files are double cut—that is, they have two series of *courses* of chisel-cuts, which are oppositely inclined at an angle of about 55° to the central line of the file. The second course is made in the same manner as the first, but with lighter blows, and is usually somewhat finer than the first. This angular crossing converts the ridges into pointed teeth. Files used for soft metals which are liable to clog the teeth, are single cut—that is, they have but one course of cuts. Taper files have the teeth finer towards the point. Rasps for wood are cut with pointed chisels; each tooth being an angular pit with a strong burr, instead of a long furrow. The newly cut teeth in the soft steel are preserved from injury by being laid upon the softer pewter block before referred to. The rapidity with which the blows are struck varies with the fineness of the file; 60 or 80 cuts are commonly made per minute.

Files have to be very carefully hardened and tempered. If heated too strongly, or made too hard, the steel is so brittle that the teeth tear off; if too soft, they wear down rapidly, and the file soon becomes useless. Great care is also required in keeping them straight, as the sudden cooling necessary for hardening is very apt to warp the steel.

At first sight, it would appear, from the simplicity and continual repetition of the movements required in file-cutting, and the precision and regularity of the work, that it is an operation specially adapted for machinery. Many attempts have been made to cut files by machinery, and lately with much success. The chief difficulty arises from the necessity of modifying the force of the blow to suit the hardness of the steel. It was once thought to be impossible to supply a number of blanks all of exactly the same hardness; for if the machine be adjusted to suit the hardness of one blank, it may strike too heavy or too light a blow for the next; whereas the workman *feels* at once the hardness of the steel he is working upon, and adjusts his blows accordingly. Machines for making files date from the early part of the present century. An inventor named Belknap, of Greenfield, Mass., patented one in 1812. Capt. John Ericsson invented one in 1836, and Winslow of Boston in 1847. None were wholly successful until those of M. Bernot of Paris and Mr. W. T. Nicholson of Providence, R. I., were introduced, the latter in 1865.

FILING.—To the uninitiated, this may seem a simple operation of rubbing one piece of metal upon another, and requiring only muscular strength and no skill. This is far from being the case, for a skillful workman will, in a given time, with a given amount of muscular work, cut away a far greater quantity of metal with a file than one who is unskillful, for he makes every tooth *cut into* the work, instead of *rubbing over* it. To do this, he must adapt the pressure and velocity of motion of the file to the coarseness of its teeth, and the hardness, brittleness, and toughness of the material he is working upon.

To *file flat*, that is, to avoid rounding the sharp edges of a narrow piece of work, is very difficult, and some years of continual practice is required before an apprentice can do this well, especially in “smoothing up” or finishing work before polishing, and there are some who never succeed in filing, smoothing, and polishing without rounding the edges of fine work. The power of doing this constitutes the main test of skill among mathematical instrument makers and other metal-workers. The flattest surface can be obtained by laying the work, where its form admits, upon a piece of cork held in the vise, and filing it with *one hand*, the pressure on the file being communicated by the forefinger.

It is mainly to aid the workman in filing flat that the rounded or bellied form is given to files; this partially compensates the tendency of the hands to move in a curved line with its convexity upwards when they move forward and apply pressure, as in the act of filing.

FILE FISH. See BALISTES.

FILIATION, the correlative of paternity. In the law of Scotland, the **F.** of a child is the process by which its paternity is determined. The general rule that the father is he whom the marriage points out (*pater est quem nuptia demonstrant*), is a presumption which may be overcome by showing its impossibility in point of fact—as, for example, where the husband is impotent, or where he has been absent from his wife during the period between the eleventh solar and the sixth lunar month preceding the birth.

FILIBUSTERS, another name for the piratical adventurers whose origin and history are treated of under *Buccaneers* (q.v.). It has, moreover, become familiar to English ears as the designation of certain lawless adventurers belonging to the United States, who made attempts violently to possess themselves of various countries in North America. The plea urged by these persons was generally this: that such countries were a prey to anarchy and oppression, and could only attain to prosperity by annexation to the United States, and the introduction of democratic institu-

tions—among which, strange to say, slavery stood prominent. The most notorious of these filibusters was the late William Walker, whose expedition against Nicaragua in 1855 was so far successful that he kept his ground in that country for nearly two years. At last, he was driven out by a combination of the various states of Central America. He was subsequently captured and shot, Sept. 12, 1860, at Truxillo, in Central America, in the course of another piratical expedition.

FILICAJA, **VINCENZO**, a lyrical poet of Italy, was b. at Florence, of an ancient but impoverished family, in 1642. Deeply wounded, while yet a youth, in his affections, he resolved to dedicate his undivided genius to heroic, martial, and sacred themes, forswearing all amatory compositions for the future, and perversely consigning his exquisite love inspirations to the flames. In six sublime odes, F. celebrated the deliverance of Vienna in 1683 from the besieging forces of the Turks, chiefly effected by the heroism of John Sobieski, king of Poland, and of Charles duke of Lorraine. On the publication of the odes in Florence in 1684, F. became, almost in spite of himself, famous, and attracted the notice of queen Christina of Sweden, an ardent admirer and munificent protectress of Italian letters and genius. Relieved from harassing pecuniary embarrassments by the liberal patronage of Christina, F. was enabled, with undisturbed powers, to devote himself to composition, some of his most touching verses being addressed to his royal benefactress. Patriotic sonnets, the grandest of which is a lament over the internal weakness of Italy—*Italia, Italia, O tu cui feo la sorte*—and heroic odes, severely classic in form, are the chief works of Filicaja. His career as patriot, citizen, and man, won him reverence and love as universal as was the admiration accorded to his works. In advanced age, he was appointed judge and senator, and in 1702 was called to one of the highest magisterial offices in Florence, where he died in honored peace, Sept. 24, 1707. His works, under the title of *Poesie Toscane di Vincenzo da Filicaja, Senatore Fiorentino e Accademico della Crusca*, were published after his death. The best edition is that of Venice (2 vols. 1762), containing both the Italian and Latin verses of the author.

FILICES. See **FERNS**.

FILIGREE, from the Italian *filigrana* (*filo*, a thread or wire, and *grano*, a grain or bead), the old filigree-work being ornamented with small beads. The name is now applied to delicate wire-work ornaments, usually made of gold or silver wire, which is twisted into spirals and other convoluted forms; and these spirals, etc., are combined to form a sort of metallic lace-work, which is shaped into brooches, ear-rings, crosses, head ornaments, and others of a very light and elegant character. This work is chiefly done in Malta, India, Genoa, the Ionian islands, and some parts of Turkey. It sometimes receives the general name of *Maltese work*, and consists in curling, twisting, and plaiting fine pliable threads of metal, and uniting them at their points of contact with gold or silver solder and borax, by the help of the blow-pipe. Small grains or beads of the same metals are often set in the eyes of volutes on the junctions, or at intervals at which they will effectively set off the wire-work. The more delicate tracery is generally protected by framework of stouter wire. Brooches, crosses, ear-rings, and other personal ornaments of modern filigree are usually surrounded and subdivided by bands of square or flat metal, giving consistency to the filling up, which would not otherwise keep its proper shape. Probably the oldest existing jewel work is that which has been found by Belzoni, Wilkinson, Mariette, and other Egyptian discoverers in the tombs of Thebes and similar places, in which filigree forms an important feature of the ornamentation. Amongst the jewelry now in the British museum, and in the Louvre in Paris, are examples of the round plaited gold chains of fine wire, such as are still made by the filigree workers of India, and known as Trichinopoly chains. From some of these are hung smaller chains of finer wire, with minute fishes and other pendants fastened to them. Most of the rings found in these collections are whipped with gold wire soldered to the hoop. The Greek and Etruscan filigree of about 3,000 years ago is of extraordinary fineness and perfect execution. A number of ear-rings and other personal ornaments found in central Italy are preserved in the Campana collection of the Louvre and amongst the gems of the British museum. Almost all of them are made of filigree. Some ear-rings are in the form of flowers of geometric design, bordered by one or more rims, each made up of minute volutes of gold wire, and this kind of ornament is varied by slight differences in the way of disposing the number or arrangement of the volutes. But the feathers and petals of modern Italian filigree are not seen in these ancient designs. In many ear-rings, chains hang from the upper part, and tiny birds, such as doves or peacocks, covered with enamel, are set amongst these hanging ornaments. Other Etruscan ear-rings are short tubes of gold, half or three quarters of an inch long by half an inch or less in diameter, with a plate of gold attached to the side, and the whole surface covered with filigree soldered on in minute patterns. Many rings resemble fishes with the tails in their mouths, made up of thin plates of gold and wire work of the same metal. A beautiful collection of antique examples of Greek jewelry found in the Chersonese and along the coast of Asia Minor was placed, before the Crimean war, in a museum at Kertch. Many bracelets and necklaces in that collection are made of twisted wire, some in as many as seven rows of plaiting, with clasps in the shape of

heads of animals of beaten work. Others are strings of large beads of gold, with grains of gold, or with volutes and knots of wire soldered over the surface. In the British museum a scepter, probably that of a Greek priestess, is covered with plaited and netted gold wire, finished with a sort of Corinthian capital and a boss of green glass. It is probable that in India and various parts of central Asia filigree has been worked from the most remote period without any change in the designs. Whether the Asiatic jewelers were influenced by the Greeks settled on that continent, or merely trained under traditions held in common with them, it is certain that the Indian filigree workers retain the same patterns as those of the ancient Greeks, and work them in the same way, down to the present day. Wandering workmen are given so much gold, coined or rough, which is weighed, heated in a pan of charcoal, beaten into wire, and then worked in the courtyard or veranda of the employer's house, according to the designs of the artist, who weighs the complete work on restoring it, and is paid at a specified rate for his labor. Very fine grains or beads and spines of gold, scarcely thicker than a coarse hair, projecting from plates of gold are methods of ornamentation still used. This work requires the utmost delicacy of hand, and is of extraordinary richness of effect. Signor Castellani, the modern Cellini of Italy, who has made the unique filigree of the Etruscans and Greeks his special study, found it for a long time impossible to revive this particular process of delicate soldering; but the difficulty has been overcome at last. Passing to later times, we may notice in many collections of mediæval jewel work, reliquaries, covers for the gospels, etc., made either in Constantinople from the 6th to the 12th c., or in monasteries in Europe, in which Byzantine goldsmiths' work was studied and imitated. These objects, besides being enriched with precious stones, polished but not cut into facets, and with enamel, are often decorated with filigree. Large surfaces of gold are sometimes covered with scrolls of filigree soldered on; and corner pieces of the border of book covers, or the panels of reliquaries, are not unfrequently made up of complicated pieces of plaited work alternating with spaces incrustated with enamel. Byzantine filigree work occasionally has small stones set amongst the curves or knots. In the n. of Europe, the Saxons, Britons, and Celts were from an early period skillful in several kinds of goldsmiths' work. As early as the middle of the 5th c., the brooches and other personal ornaments of the "*Littus Saxonum*" in England were encrusted with enamel work varied with borders or centers of filigree. The Irish filigree work is more thoughtful in design and more varied in pattern than that of any period or country that could be named. It reached its highest perfection, according to Dr. Petrie, in the 10th and 11th centuries. The royal Irish academy in Dublin contains a number of reliquaries and personal jewels, of which filigree is the general and most remarkable ornament. The "*Tara*" brooch has been copied and imitated, and the shape and decoration of it are well known. Instead of fine curls or volutes of gold thread, the Irish filigree is varied by numerous designs, in which one thread can be traced through curious knots and complications, which, disposed over large surfaces, balance one another, but always with special varieties and arrangements difficult to trace with the eye. The long threads appear and disappear without breach of continuity, the two ends generally worked into the head and tail of a serpent or a monster. The reliquary containing the "*bell of St. Patrick*" is covered with knotted work in many varieties. A two-handed chalice, called the "*Ardagh cup*," found near Limerick a few years since, has belts, bosses at the junctions of the handles, and the whole lining of the foot ornamented with work of this kind of extraordinary fineness. The late Lord Dunraven described forty varieties of pattern of this cup alone. Much of the mediæval jewel work all over Europe down to the 15th c., on reliquaries, crosses, crosiers, and other ecclesiastical goldsmiths' work, is set off with bosses and borders of filigree. Filigree in silver was practiced by the Moors of Spain during the middle ages with great skill, and was introduced by them and established all over the peninsula, where silver filigree jewelry of delicate and artistic design is still made in considerable quantities. The manufacture spread over the Balearic islands, and among the populations that border the Mediterranean, and continues all over Italy, and in Albania, the Ionian islands, and many other parts of Greece. That of the Greeks is sometimes on a large scale, with several thicknesses of wire alternating with larger and smaller bosses and beads, sometimes set with turquoises, etc., and mounted on convex plates, making rich ornamental head-pieces, belts, and breast ornaments. Filigree silver buttons of wire-work and small bosses are worn by the peasants in most of the countries that produce this kind of jewelry. Silver filigree brooches and buttons are made also in Denmark, Norway, and Sweden. Little chains and pendants are added to much of this northern work. Beautiful specimens have been contributed to the various international exhibitions. Some very curious filigree was brought from Abyssinia after the capture of Magdala—arm guards, slippers, cups, etc. They are made of thin plates of silver, over which the wire-work is soldered. Filigree is subdivided by narrow borders of simple pattern, and the intervening spaces are made up of many patterns, some with grains set at intervals. Great interest has been felt in the revival of the designs of antique jewelry by Signor Castellani. He collected examples of the peasant jewelry still made in many provinces of Italy on extraordinary designs preserved from a remote antiquity. Most of the decoration is in filigree of many varieties. It was in part through the help of workmen in remote villages, who retained the use of various kinds of solders, long forgotten else-

where, that the fine reproductions of antique gold filigree have been so beautifully executed in Italy, and by Italian jewelers.

FILIOQUE, a Latin term signifying "and from the Son," designates a controversy between the Greek and Latin churches which has been prolonged through many centuries. The council of Nicæa, 325 A.D., while it affirmed that the Son is of the same substance with the Father, simply added that it believed in the Holy Spirit. The council of Constantinople, 381 A.D., declared that the Spirit is of the same substance with the Father and the Son, and that he proceedeth from the Father. This is in accordance with the teaching of Christ to his apostles, and, while it does not affirm that he proceedeth from the Father *only*, certainly seems to imply it. In the Latin church the idea of the double procession seems always to have prevailed. Augustin taught clearly that the spirit proceedeth from both the Father and the Son. At the third synod of Toledo, 589 A.D., which, however, had not ecumenical authority, "filioque" was added to the creed. In the eastern church the addition was not accepted. In 809 Pope Leo III. refused to sanction the addition to the creed, but approved the doctrine as scriptural and sound. In the 9th c., when the controversy arose between the patriarch of Constantinople and the pope which caused the schism between the churches, the doctrinal difference was discussed, and the western church was reproached for having departed from the faith. At length Rome did add the clause to the creed, but not publicly; no decretal or other document announced it to the church. In 1014, when Henry II. was crowned at Rome, the creed with the added clause was chanted at high mass. In 1274, at the council of Lyons, a vain attempt to reconcile the two portions of the church was made. In 1439, at the council of Florence, the effort was renewed, at first with apparent success; but the Greek church would not accept the compromise that had been agreed on. Later efforts have been equally unsuccessful. Yet the two churches both maintain the doctrine of the Trinity, while they differ only in the vain endeavor to understand and explain it. And even in this there is substantial agreement between them, for the Greek church admits the doctrine of a double procession in a sense which is in accordance with Scripture and is, probably, not essentially different from that which the Latin church maintains. In 1718, the Greek patriarch and synod made the following declaration: "We thus believe that there is a twofold procession of the Holy Spirit, the one natural, eternal, and before time, according to which the Holy Spirit proceeds from the Father alone; the other, temporal and deputative, according to which the Holy Spirit is externally sent forth, derived, proceeds, and flows from both the Father and the Son for the sanctification of the creature." Both these processions are contained in the words of Christ: "*The Comforter, whom I will send unto you from the Father; even the Spirit of truth who proceedeth from the Father.*" At a conference of Old Catholic, Anglican, and eastern theologians, held at Bonn in 1874, there was a general agreement that the words *filioque* had been added to the creed in an illegal manner; and that peace and unity would be greatly promoted if the entire church could find a way to restore the creed to its original form, without sacrificing the doctrine held by the western churches. Thus far there has been no announcement of any progress towards the accomplishment of the desired unity.

FILIPPO-D'ARGIRO, SAN, a t. of Sicily, in the province of Catania, and about 30 m. w.n.w. of the town of that name, stands on the right bank of the Traina, in an exceedingly fertile district. It contains a ruined Saracenic castle, and several religious edifices. Saffron of good quality, and in considerable quantity, is grown in the vicinity. Pop. about 13,000. San Filippo-D'Argiro stands on the site of the ancient Sikelian city of Agryum, the birthplace of Diodorus Siculus, and which, about 400 B.C., is said to have had 20,000 citizens.

FILLAN, SAINT. Two Scoto-Irish saints of the name of Fillan appear in the church calendars, and have left their mark on the topography of Scotland and Ireland. (1.) ST. FILLAN, or Faolan, surnamed the Leper, had his yearly festival on the 20th of June. His chief church in Scotland was at the e. end of loch Erne, in Perthshire, where "St. Fillan's well" was long believed to have supernatural powers of healing. A seat in the rock of Dunfillan still keeps the name of "St. Fillan's chair," and two cavities beside it are said to have been hollowed by St. F.'s knees in prayer. His Irish church is at Ballyheyland (anciently called Killhelan or Kill Faelain), in the barony of Cullenagh, in Queen's county. (2.) ST. FILLAN, the abbot, the son of St. Kentigerna of Inchcaileach, in loch Lomond, lived in the 8th c., and had his yearly festival on the 7th or 9th of Jan. He joined the monastery of St. Mund on the Holy loch, and after that saint's death, succeeded him as abbot. His chief church in Scotland was in Perthshire, in the upper part of Glendochart, which takes from him the name of Strathfillan. Here, a well-endowed priory, dedicated in his honor, was repaired, or rebuilt, in the beginning of the 14th century. King Robert Bruce made a grant of money to the work, in gratitude, probably, for the miraculous encouragement which he was said to have received on the eve of Bannockburn from a relic of the saint—one of his armbores inclosed in a silver case. Another relic of St. F.—the silver head of his crosier, or pastoral staff—has been preserved to our time. It is called the "coygerach," or "quigrich," and appears in record as early as the year 1428, when it was in the

hereditary keeping of a family named Jore or Dewar, who were believed to have been its keepers from the time of king Robert Bruce. They had half a boll of meal yearly from every parishioner of Glendochart who held a merk land, and smaller quantities from smaller tenants; and they were bound, in return, to follow the stolen cattle of the parishioners wherever their traces could be found within the realm of Scotland. The quigrich, besides its virtues in the detection of theft, was venerated also for its miraculous powers of healing. In 1487, the right of keeping it was confirmed to Malice Doire, or Dewar, by king James III., in a charter, which was presented for registration among the public records of Scotland so lately as the year 1734. Sixty years later, the quigrich still commanded reverence; but its healing virtues were now only tried on cattle, and its once opulent keepers had fallen to the rank of farm-laborers. It was publicly exhibited in Edinburgh, in the year 1818, before being carried to Canada, by its hereditary keeper, Archibald Dewar. His son, Alexander Dewar, desirous that it should be restored to Scotland, came to an arrangement whereby, partly by purchase and partly by gift, it became the property of the society of antiquaries of Scotland. It was described by Dr. Daniel Wilson in a paper in the *Canadian Journal*, No. xxiv., reprinted as *The Quigrich, or Crosier of St. Fillan* (Toronto, 1859); see also *Historical Notices of St. Fillan's Crosier* by Dr. Stuart, reprinted from the *Proceedings of the Society of Antiquaries of Scotland*, vol. xii. (1877). A linn in the river Fillan, or Dochart, in Strathfillan, was long believed to work wonderful cures on insane persons, who were immersed in the stream at sunset, and left bound hand and foot till sunrise in the ruins of the neighboring church of St. Fillan. A hand-bell, which bore the name of St. Fillan, was also believed to work miracles.

FILLET, in architecture, a small space or band like a narrow ribbon used along with moldings.

FILLET, in heraldry, is an ordinary, which, according to Guillim, contains the fourth part of the chief.

FILLMORE, a co. in s.e. Minnesota, on the Iowa border on Root river, intersected by the Chicago, Milwaukee, and St. Paul railroad; 864 sq. m.; pop. '90, 26,338. The surface is undulating prairie, with forests of good timber. The soil is fertile; productions, corn, wheat, oats, butter, etc. Limestone underlies the surface. Co. seat, Preston.

FILLMORE, a co. in s.e. Nebraska, drained by a tributary of Big Blue river; 576 sq. m.; pop. '90, 16,022. Undulating surface, and fertile soil, but not much cultivated. Co. seat, Geneva.

FILLMORE, MILLARD, an American statesman, thirteenth president of the United States, was b. on 7th Feb., 1800, at Summer Hill, New York. Born of English parents, in rather straitened circumstances, all the education he received was the very imperfect instruction furnished by the village school. At the age of 15, he was sent to the county of Livingston, there to learn the drapery trade, and soon afterwards was bound apprentice to a wool-carder in his native village. During the four years he labored at this occupation, he used every means at his disposal to cultivate his mind, devoting his evenings to reading and study. In his 19th year, he made the acquaintance of a lawyer named Wood, who discovering in the young man talents worthy of a loftier sphere, took an interest in him, and offered him a situation in his office, at the same time supplying him with funds for the prosecution of his studies for the legal profession. The attention bestowed upon him by his benefactor was not thrown away. He entered with ardor upon the course thus marked out for him, and in order that he might not be too great a burden upon his friend, devoted a part of his time to conducting a school. He removed to Buffalo in 1821 in order to complete his studies, and in 1823 was admitted a member of the bar. A brilliant career was thus opened up for him, and he delayed not to pursue it. He gradually acquired both means and reputation. In 1829, he began his political career, being in that year chosen as a representative of the county of Erie in the legislature of New York, where he entered the ranks of the whig party, at that time in opposition. Here his probity and modesty soon gained him universal esteem. He was mainly instrumental in procuring the abolition of imprisonment for debt in the state of New York. In 1832, F. was elected a member of congress, and such were the statesmanlike qualities displayed by him, that he was several times re-elected; but in 1844, he resumed his profession of advocate. In 1847, however, he again returned to public life, being elected by a large majority to the post of comptroller of New York; and in the following year he was made vice-president of the United States. The unexpected death of Gen. Taylor in July, 1850, leaving the office of president vacant, F. was raised to that high office, which he held till 1853. His presidency was marked by the passing of some very salutary measures, notwithstanding that his party were in the minority. He promoted as far as he could the progress of exploration and discovery, at home and abroad. In 1855, F. visited Europe, and on his return in 1856, he was nominated for the presidency by the American party, but was not elected. F. took no part in the civil war, though he sided with the union. After the expiry of his term of office, he retired to Buffalo, where he died in 1874.

FILMER, Sir ROBERT, an English writer of the 17th c., who upheld in the extreme degree "the divine right of kings." He assumed that the father was the ruler of the family and the king was the father of his people, and both were absolute rulers with power even to take life. It is doubtful if his opinions, which occasioned violent discussion in his day, would have been heard of in these times, if Locke had not undertaken, in his *Treatise on Government*, seriously to controvert them.

FILTER—FILTRATION. When solid matter is suspended in a liquid in which it is insoluble, it may be separated by various means. Under the article **FIXING**, various methods of causing such suspended matter to collect together and sink to the bottom or float on the surface, and thereby clearing the liquid, are described. The process of filtration consists in passing the liquid through some porous substance, the interstices of which are too small to admit of the passage of the solid particles, the principle of the action being the same as that of a sieve; but as the particles of fluids are immeasurably small, the pores must be extremely minute.

One of the simplest forms of filter is that commonly used in chemical laboratories for separating precipitates, etc. A square or circular piece of blotting-paper is folded in four, the corner where the four folds meet is placed downwards in a funnel, and one side is partly opened, so that the paper forms a lining to the funnel. The liquid passes through the pores of the paper, and the solid matter rests upon it. The chief advantages of this filter are its simplicity, and the ease with which the solid matter may be removed and examined.

A simple water-filter for domestic purposes is sometimes made by stuffing a piece of sponge in the bottom of a funnel or the hole of a flower-pot, and then placing above this a layer of pebbles, then a layer of coarse sand, and above this a layer of pounded charcoal three or four inches in depth. Another layer of pebbles should be placed above the charcoal, to prevent it from being stirred up when the water is poured in. It is obvious that such a filter will require occasional cleaning, as the suspended impurities are left behind on the charcoal, etc. This is best done by renewing the charcoal, etc., and taking out the sponge and washing it. By a small addition to this, a cottage-filter may be made, which, for practical use, is quite equal to the most expensive filters of corresponding size. It consists of two flower-pots, one above the other; the lower one is fitted with the sponge and filtering layers above described, and the upper one with a sponge only. The upper pot should be the largest, and if the lower one is strong, the upper one may stand in it, or a piece of wood with a hole to receive the upper pot may rest upon the rim of the lower one. The two pots thus arranged are placed upon a three-legged stool with a hole in it, through which the projecting part of the lower sponge passes, and the water drops into a jug placed below. The upper pot serves as a reservoir, and its sponge stops the coarser impurities, and thus the filtering layers of the lower one may be used for two or three years without being renewed, if the upper sponge be occasionally cleaned. Care must be taken to wedge the upper sponge tightly enough, to prevent the water passing from the upper pot more rapidly than it can filter through the lower one.

A great variety of filters are made on a similar principle to the above, but constructed of ornamental earthenware or porcelain vessels of suitable shape. It would occupy too much space to enter upon the merits of the filters of different makers, especially as there is really very little difference between them in point of efficiency, and nearly all the domestic filters that are offered for sale are well adapted for their required purpose. In purchasing a filter, the buyer must not be satisfied with merely seeing that the water which has passed through it is rendered perfectly transparent—this is so easily done by a new and clean filter—but he should see that the filter is so constructed as to admit of being readily cleansed, for the residual matter must lodge somewhere, and must be somehow removed. When large quantities of water have to be filtered, this becomes a serious difficulty, and many ingenious modes of overcoming it have been devised. In most of these, water is made to *ascend* through the filtering medium, in order that the impurities collected on it may fall back into the impure water. Leloge's ascending filter consists of four compartments, one above the other; the upper part, containing the impure water, is equal in capacity to the other three. This communicates by a tube with the lower one, which is of small height. The top of this is formed by a piece of porous filtering-stone, through which alone the water can pass into the third compartment, which is filled with charcoal, and covered with another plate of porous stone. The fourth compartment, immediately above the third, receives the filtered water, which has been forced through the lower stone, the charcoal, and the upper stone. A tap is affixed to this, to draw off the filtered water, and a plug to the second or lower compartment, to remove the sediment. At the top of the tube by which the first and second compartments communicate, a sponge may be placed to stop some of the grosser impurities.

Since 1831, when this filter was contrived, a number of ascending filters have been patented, many of them being merely trifling modifications of this. Bird's siphon filter is a cylindrical pewter vessel containing the filtering media, and to it is attached a long coil of flexible pewter pipe. When used, the cylinder is immersed in the water-butt or cistern, and the pipe uncoiled and bent over the edge of the cistern, and brought down considerably below the level of the water. It is then started by applying the mouth to the lower end, and sucking it till the water begins to flow, after which it continues to

do so, and keeps up a large supply of clear water. This, of course, is an ascending filter, and the upward pressure is proportionate to the difference between the height of the water in the cistern and that of the lower end of the exit tube. See SIPHON. Sterling's filtering tanks are slate cisterns divided into compartments, the water entering the first, then passing through a coarse filter to a second, and from there through a finer filter to the main receptacle, where the filtered water is stored and drawn off for use.

A common water-butt or cistern may be made to filter the water it receives by the following means: Divide the cistern or butt into two compartments, an upper and a lower, by means of a water-tight partition or false bottom; then take a wooden box or small barrel, and perforate it closely with holes; fit a tube into it, reaching to about the middle of the inside, and projecting outside a little distance; fill the box or barrel with powdered charcoal, tightly rammed, and cover it with a bag of felt; then fit the projecting part of the tube into the middle of the false bottom. It is evident that water can only pass from the upper to the lower compartment by going through the felt, the charcoal, and the tube, and thus, if the upper part receives the supply, and the water for use is drawn from the lower part, the whole will be filtered. It is easily cleaned by removing the felt and washing it.

Various means of compressing carbon into solid porous masses have been patented, and filters are made in which the water passes through blocks of this compressed carbon. Most of these are well adapted for the purpose, but their asserted superiority over filters composed of layers of sand and charcoal is doubtful. A very elegant and convenient portable filter for soldiers, travelers, and others who may require to drink from turbid ponds and rivers, was constructed of Ransome's filtering stone, and is also made of the compressed carbon. A small cylinder of the stone or carbon is connected with a flexible India-rubber tube in such a manner that the cylinder may be immersed in a river, the mouth applied to a mouth-piece at the other end of the tube, and the water drawn through the filtering cylinder.

The filtration of water on a large scale will be treated of under WATER-SUPPLY.

Some very interesting experiments were made by Mr. H. M. Witt, to ascertain whether soluble matter, such as common salt, is in any degree removed from water by filtration. Theoretically, it has been assumed that this is impossible, since the filter only acts mechanically in stopping suspended particles; but the results of Mr. Witt's experiments show that from 5 to 15 per cent of the soluble salts were separated by sand-filters such as above described. This is a curious and interesting subject, well worthy of further investigation. Another most important matter, on which a series of accurate experiments is required, is to ascertain to what extent soluble organic matter may be decomposed by filtration, especially by charcoal filters, and to ascertain how long charcoal and other porous matter retains its property of acting on organic matter in watery solution. The power of dry charcoal in decomposing organic matter in a gaseous state is well established (see below), and it is also well known that fresh charcoal acts powerfully upon organic matter in solutions, but the extent to which this power is retained in the charcoal of a filter in continuous action has not been satisfactorily ascertained. This is of the highest importance, as it sometimes happens that water of brilliant transparency, and most pleasant to drink, on account of the carbonic acid it contains, is charged with such an amount of poisonous organic matter as to render its use as a daily beverage very dangerous. Charcoal obtained from burning bones is still more efficacious than charcoal from wood. A filter of animal charcoal will render London porter colorless. Loam and clay have similar properties. Prof. Way found that putrid urine and sewer water, when passed through clay, dropped from the filter colorless and inoffensive.

When a liquid contains mucilaginous or other matter having viscous properties, there is considerable difficulty in filtering it, as the pores of the medium become filled up and made water-tight. Special filters are therefore required for sirups, oils, etc. Such liquids as ale, beer, etc., would be exceedingly difficult to filter, and therefore they are clarified by the processes described under FINING. Oil is usually passed through long bags made of twilled cotton cloth (Canton flannel). These are commonly 4 to 8 ft. long, and 12 to 15 in. in diameter, and are inclosed in coarse canvas bags, 8 or 10 in. in diameter, and thus the inner filtering-bag is corrugated or creased, and a large surface in proportion to its size is thus presented. Sirups are filtered on a small scale by confectioners, etc., by passing them through conical flannel bags, and on a large scale in the *creased bag-filter* just described. Thick sirups have to be diluted or clarified with white of egg, to collect the sediment into masses, and then they may be filtered through a coarse cloth strainer. Vegetable juices generally require to be treated in this manner.

The simple laboratory filter has to be modified when strong acid or alkaline solutions, or substances which are decomposed by organic matter, require filtration. Pure silicious sand, a plug of asbestos, pounded glass, or clean charcoal, are used for this purpose. Böttger recommends gun-cotton as a filter for such purposes. He has used it for concentrated nitric acid, fuming sulphuric acid, chromic acid, permanganate of potash, and concentrated solutions of potash and aqua regia. He says that properly prepared gun-cotton is only attacked at ordinary temperatures by acetic ether.

Filtering paper for laboratory purposes requires to be freed from inorganic impuri-

ties that are soluble in acids, etc.; this is effected by washing the paper with hydrochloric acid, or, when thick, with nitric and hydrochloric acid, and removing the acid by washing thoroughly with distilled water.

When a considerable quantity of liquid has to pass through a filter, it is sometimes desirable that it should be made to feed itself. In the laboratory, this is done by inverting a flask filled with the liquid over the filtering funnel, the mouth of the flask just touching the surface of the liquid when at the desired height in the funnel. As soon as it sinks below this, air enters the flask, and some liquid falls into the funnel. On a large scale, self-acting filters are fed by the common contrivance of a ball-cock and supply-pipe.

Air-Filters.—The extraordinary powers of charcoal in disinfecting the gaseous products evolved from decomposing animal and vegetable matter, have been made available by Dr. Stenhouse in constructing an apparatus for purifying air that is made to pass through it. A suitable cage, containing charcoal in small fragments, is fitted to the opening from which the deleterious gases issue, and is found to render them perfectly inodorous, and probably innocuous. The first application of this was made in 1854, when a charcoal air-filter was fitted up in the justice-room of the mansion house, London, the window of which opens above a large urinal, the smell of which was very offensive in the room. The filter at once destroyed the nuisance, and the charcoal has been found to last many years without the need of renewal. 103 of such filters have been applied to the outlets of the sewers of one district of the city of London, and no bad smell is observable where they are placed, and no obstruction offered to the ventilation of the sewers. They have been applied with like results in two or three county towns. The subject is fully treated by Dr. Stenhouse in a letter to the lord mayor, published by Churchill (London). Charcoal respirators are small air-filters of the same kind applied to the mouth. See RESPIRATOR.

FILUM AQUÆ, the imaginary line along the middle of a stream which is the boundary of property on the opposing shores. Boundaries are usually specially defined, but in the absence of express terms the line between two nations, or states, or counties, or private farms, if it run along a stream, would be in the middle of such stream, and if an island should interpose the line would divide it to each party by a line corresponding to the course of the stream from the middle of the channel above to the middle of the channel below.

FIMBRIATED (Lat. *fimbria*, a border or hem), is said, in heraldry, of an ordinary having a narrow border or edging of another tincture.

FINALE, or **FINALE NELL' EMILIA**, a small town of n. Italy, in the province of Modena, on the Panaro, 22 m. n.e. from Modena. It is surrounded by walls, has manufactures of linen and silk, and an active general trade. Pop. 4500.

FINALE, the name given to that part of a musical composition which finishes the act of an opera; also to the last movement of an instrumental composition, as in the symphony, quartet, quintet, sonata, etc. The character of the finale, in purely instrumental works, is always lively. In the opera, it depends on the subject, while in some operas the finale consists of an aria alone, as in Mozart's *Figaro*, instead of the usual full concerted music for soli and chorus.

FINAL JUDGMENT. The meaning of this term in the law of Scotland having led to some dispute, an act of sederunt was passed on the 11th July, 1828, declaring it to be applicable to a case in which "the whole merits of the cause have been disposed of, although no decision has been given as to expenses, or, if expenses have been found due, although they have not been modified or decerned for." The importance of the definition arises from the fact, that only final judgments can be carried by advocacy from the inferior to the superior courts. "The whole merits of the cause" has been held to mean, not only the merits of the action to which the advocator is a party, but also those of any other conjoined with it. If the parties in the conjoined action will not proceed to have it determined, the advocator ought to apply to the inferior judge, stating his intention to advocate, and praying him to call on the parties to proceed with the conjoined process; and, failing their doing so, to disjoin the causes, which disjunction will render an advocacy competent. Shand's *Practice*, i. p. 454.

FINANCE, a French word incorporated with our language, means the art of managing money matters, the person who professes this art being called a financier. Finance, in the plural, is often used for money itself, but still with a reference to the purpose to which it is to be applied, as where the finances of a country are said to have improved or fallen off—that is to say, have become abundant or scanty according to the expenditure of the country. Sometimes the word is applied to private wealth, but it is properly applicable to public funds. We use it in this country rather in a political and economic sense than officially, but in France there have been, from time to time, comptrollers-general of finance, councils of finance, bureaux of finance, etc. Many statesmen have been spoken of as great financiers, from the talent which they have shown for adjusting national revenue and expenditure, as Colbert, Turgot, and Necker in France, and Godolphin and Peel in Britain. As a branch of statesmanship, finance is intimately connected with other branches. In questions of national policy—such as,

whether a state can go to war or not—the financier is the person who is expected to count the cost, and say how the necessary funds are to be obtained. In the question, whether an unpopular or oppressive tax is to be abolished, the financier is an authority on the question, whether the government can do without it. Hence, there is a special connection between finance and taxation, which has become closer and stronger since the progress of political economy has shown that the taxes which are the most productive, and even the most easily collected, are not always the best, looking at the gain or loss of a nation in the long-run. Turgot said that finance was the art of plucking the fowl without making it cry. On this notion, the principle of indirect taxation achieved its popularity. For instance, customs duties seem to fall on no one. The importer and the retailer add them to the price of the article, and the ultimate purchaser only knows that the article is dear without experiencing the sense of hardship felt by one who pays out money directly in the shape of a tax. But many indirect taxes have, on the other hand, been found to affect the trade and the wealth of communities to an extent which has made them very deleterious in comparison with direct taxes. See further on matters connected with finance the heads **CORN LAWS**; **CURRENCY**; **CUSTOMS DUTIES**; **DEBT, NATIONAL**; **EXCISE**; **FREE TRADE**; **MONEY**; **STAMPS, TARIFF**; **TAX**.

FINBACK. See **RORQUAL**.

FINCASTLE: a magisterial dist., Botetourt Co., Va.; including the vill. of Fincastle, cap. of Botetourt co. Pop. of dist. '90, abt. 5000.

FINCH (Ger. *Fink*; for the origin of the word, see **CHAFFINCH**), the popular name of a great number of species of little birds of the order *insectores*, and tribe *conirostres*. Many of them have great powers of song, and are called *hard-billed song-birds*, in contradistinction to the warblers (*syliadae*) or *soft-billed song-birds*. The name F. is sometimes used as equivalent to *fringillidae* (q. v.), either in its more extensive or more restricted application; but the limits of its popular use are very indeterminate, and some birds are equally known as finches and as linnets, or as grosbeaks, etc. The word F. often forms part of the popular name of birds of this family, as bull-finch, chaffinch, haw-finch, etc.

FINDER OF GOODS. The finder acquires a special property in goods, which is available to him against all the world except the true owner; but before appropriating them to his own use, he must use every reasonable means to discover the owner. It has been decided that if the property had not been designedly abandoned, and the finder knew who the owner was, or knew that he could have discovered him, he was guilty of larceny in keeping and appropriating the articles to his own use. Thus, when a person purchased, at a public auction, a bureau, in which he afterwards discovered, in a secret drawer, a purse containing money, which he appropriated to his own use, Mr. Baron Parke thus laid down the law. "The old rule, that 'if one lose his goods, and another find them, though he convert them *animo furandi* to his own use, it is no larceny,' has undergone in more recent times some limitations. One is, that if the finder knows who the owner of the lost chattel is, or if, from any mark upon it, or the circumstances under which it is found, the owner could be reasonably ascertained, then the fraudulent conversion, *animo furandi*, constitutes a larceny." This law, however, although in most cases clear, is, in others, extremely difficult in application.

FIN DE SIÈCLE (French, "end of the century"), a phrase that became popular in Paris in 1889 and since then has made its way into the vocabulary of all other countries, as a jesting way of qualifying anything novel, surprising, or piquant. Freaks of fashion, striking events, ingenious inventions, daring deeds, shocking scandals, and political surprises are all characterized as "*fin de siècle*," and the phrase is likely to remain in general use, until the real *fin de siècle* has actually come, and the twentieth century makes the expression inappropriate.

FINDLAY, city and co. seat of Hancock county, Ohio, forty-four miles south of Toledo, is situated in the center of the oil and gas fields of Ohio, and is remarkable for its rapid growth in manufactures and population. Natural gas was known to exist in this section as early as 1836, and in 1838 it was piped in a rude manner from a well in the heart of the present city, and thus used in the owner's building, until the town was piped for gas in 1884. This gas is found in the Trenton limestone, at a depth varying from 1092 to 1312 feet, and the field is believed to be the largest in the world, underlying a territory thirty-six miles long and nine miles wide. Within these limits the drill never penetrates the Trenton rock without striking gas. The growth of the city since the first well was opened in 1885 had been phenomenal. Of the many gas wells, the Tippecanoe, drilled on the eve of the Presidential election of 1888, and named in honor of the successful candidate, had a capacity of 31,000,000 cubic feet per day. About half the wells are owned by private individuals, and the other half by the city, which supplies gas to manufacturers and to private houses at merely nominal rates. In the vicinity of the city are found almost exhaustless beds of clay, suitable for common and pressed brick; also stone for building and for lime; and vast deposits of sand and gravel. The manufactories are numerous and varied, and include glass factories, pressed-brick works; common brick yards; foundries and machine shops; rolling-mills; extensive potteries, oil refinery; furniture, carriage, nail, and wooden implement fac-

ories; lime-kilns, etc. Findlay is on the Lake Erie and Western and several other railroads; has electric street railroads; electric lights; several banks; daily, weekly, and monthly periodicals; numerous churches; and excellent schools, both public and private, among the latter being Findlay College (Church of God), opened in 1886. Pop. '90, 18,553.

FINE OF LANDS, in England, fictitious proceedings formerly in common use in order to transfer or secure real property by a mode more efficacious than an ordinary conveyance. A fine is defined by Coke, quoting from Glanville, an amicable composition and final agreement by leave and license of the king or his justiciaries; and such indeed it was in its original effect, and it was called a fine because it put a termination (*finis*) to all litigation between the parties, and those claiming through them, in regard to all matters touching the suit. The proceedings in a fine were shortly as follows: The party to whom the land was to be conveyed commenced a fictitious suit against the vendor. But the case was no sooner in court than the plaintiff asked leave to agree or settle with the defendant. This leave having been obtained, a covenant was entered into whereby the vendor or defendant, called the *cognizor*, recognized the right of the plaintiff, called the *cognizee*, to the lands, of which he admitted that the plaintiff was wrongfully kept from the possession. These proceedings, which at first were real, were afterwards adopted universally without having a shadow of foundation in fact. This solemn farce having been completed, a *note* of the fine, being an abstract of the covenant, the names of the parties, and the parcels of the land, was entered on the rolls of the court; and the business was concluded by what was called the *foot* of the fine, setting forth the parties, the time and place of agreement, and before whom the fine was levied. The whole was embodied in indentures commencing *hæc est finalis concordia*. It was necessary that a fine should be levied openly in the court of common pleas, or before the chief-justice of that court, or before two or more commissioners appointed in the country. Fines were of four kinds, which need not be specified here. In order that a fine should have full effect, it required to be levied with *proclamations*, i.e., open proclamation of the transaction in court. A fine so levied cut off the right even of strangers who fail to assert their claim during the period allowed by law; hence an estate was said to be barred by fine and non-claim. A fine levied by a married woman had the effect of cutting off all right she might have in the lands, and was the only mode by which a married woman could convey lands.

The old law as to fines has been abolished by the *Fines and Recoveries Act*, 3 and 4 Will. IV. c. 74. This act was passed for the purpose of abolishing the cumbrous machinery used in the transfer of land according to the ancient forms and fictions. The act abolishes all the fictions formerly in use. In regard to fines and recoveries by heirs of entail, it permits every tenant in tail of freehold land whether in possession, in remainder, or contingency, to dispose of the lands for an estate of fee-simple absolute, or any less estate, by any of the ordinary conveyances, except a will, at common law, or under the statute of uses (q.v.). The conveyance must be registered in the court of chancery within six months after its execution. But where there is an estate of freehold prior to the estate tail, the act requires that the consent of the tenant of the freehold shall be necessary in order to give full effect to the conveyance. This person is called the *protector of the settlement*. Where a conveyance is made without consent of the protector, it has the effect of barring those only who would succeed under the heir by whom it is executed. This is precisely the effect which under the old law belonged to a recovery without the consent of the tenant to the *præcipe*, and of a fine levied by a tenant in tail; so that the statute, while it abolishes the fictions, sustains entails as family settlements to the limited effect which they formerly possessed. In regard to fines by married women, the act provides that a feme covert (q.v.) may dispose by deed of any lands, or of money subject to be invested in the purchase of lands. It is necessary, unless specially dispensed with by the court, that her husband should concur in the conveyance, and that she should acknowledge it before a judge of one of the superior courts at Westminster, or a master in chancery, or two of the commissioners appointed for that purpose under the act.

FINGAL, the name of the hero in the *Poems of Ossian*, written in the last century by James Macpherson, and based on the ancient traditions of the Gaelic people of Scotland and Ireland, some of which are still known among the Celtic people of the country. The *Finn*, or *Find*, of these old stories was the *Rig*, or king of the *Fians*, or *Fenians*, of Leinster, in the time of the monarch Cormac, son of Art, and he resided at a dun, or fort, at Almhain, now the hill of Allen, in the co. of Kildare, whence comes the name of the bog of Allen, given to the great central bogs of Ireland. *Find* is said to have been killed 283 A.D., at Ath Brea on the Boyne, by a fisherman who thought to become celebrated from the act. Some Norse antiquarians say that the terms *Fingal* and *Dubgal*, used by the early Irish, mean "fair" and "dark" stranger, "gal" signifying a foreigner, or invader; and that the "fair" were the Norwegian, and the "dark" the Danish pirates who ravaged Ireland about the close of the 8th century.

FINGAL'S CAVE. See **STAFFA**.

FINGER-BOARD, that part of a stringed musical instrument, as in the violin, violoncello, guitar, etc., which is made of ebony-wood, and glued on the neck of the instrument, and shaped on the top somewhat round, to suit the position in which the strings

He on the nut and the bridge. At the lower end, the finger-board projects over the sounding-board of all those instruments played with the bow, while in the guitar species the finger-board is glued down on both neck and sounding-board. The strings are stretched along the finger-board from the nut at the top to the bridge at the lower end, and are pressed down by the fingers of the left hand, to make the different notes in music; while the right hand produces the sound either by a bow or the points of the fingers.

FINGERS. See **HAND**.

FINGERS-AND-TOES, the popular name of a disease in turnips, called also Anbury (q.v.).

FINIAL, an ornament, generally carved to resemble foliage, which forms the termination of pinnacles, gables, spires, and other portions of Gothic architecture. There are traces of foliated terminations, both in stone and metal, on the pediments of classic buildings (see **ACROTERION**), but it was not till the 12th c. that the F. proper was introduced. During the latter part of that c. and the whole of the 13th c., finials of the most perfect form and of infinite variety were used as the crowning ornaments of every salient point in the buildings of the period. The architects of the 14th c., in finials, as in other ornaments, imitated more closely the forms of natural foliage; but their finials had neither the variety of design nor the vigor of outline of those of the preceding century.

In the 15th and 16th centuries, the finials became more and more meager in form, and are frequently only four crockets set upon a bare pyramidal terminal. Some variety of effect is often obtained during this period by surmounting the F. with a gilded vane. This is common in Tudor and domestic architecture. Finials were carved both in stone and wood, and in the latter material with great delicacy and minuteness. In connection with metal-work, finials of metal were used, and whatever the material adopted, its natural capabilities were made a source of special beauty.

The F. is one of the most effective ornaments of Gothic architecture, and when that style was succeeded by the revival of classic, in the reign of queen Elizabeth, our forefathers could not persuade themselves to part with the finials to their buildings. We thus find in Elizabethan architecture a great variety of finials; they are, however, almost entirely of a geometric form, and without foliage, and are frequently, especially when terminating wooden gables, combinations of F. and vane partly wood and partly iron. In the stricter classic which succeeded the Elizabethan, some traces of the favorite F. still remain in the balls, obelisks, etc., used as terminations, and also in the shields and supporters (themselves a remnant of feudalism) which form the crowning ornament of gate-piers, pedestals, etc.

FINING, the process of clearing turbid liquors, such as beer, wine, etc. The simplest mode of F. is by passing the liquor through a porous substance that retains the solids and allows the clear liquid to pass through (see **FILTER**); but this method is only applicable to particles mechanically suspended in a limpid liquid. When the liquid contains mucilaginous or other matter, that readily clogs the filter, some other means of F. must be used. Such is the case with all malt liquors and most wines when turbid. When in good condition, these do not usually require F., as the suspended matter agglomerates, and sinks to the bottom shortly after the fermentation is completed. When this does not take place, some means of promoting such action are usually adopted. One of the simplest is to add soluble albumen, such as white of egg, to a portion of the liquid, and after beating it well in this, to add the mixture, and stir it into the whole of the liquid. Upon the application of heat, the albumen coagulates and contracts from its diffusion into a scum, enveloping and drawing together the suspended matter. The scum is then easily removed. This method is adopted for sirups and other liquids that may be heated without mischief. In making clear soups, the albumen of the meat performs this function. As alcohol coagulates albumen, it may be used for fining wines and cordials without the application of heat. It is generally used for red wines. Malt liquors are usually fined by means of gelatine, either isinglass or cheaper substitutes being used. One pound of isinglass is soaked in three or four pints of water, or sour beer, then more sour liquor added as the isinglass swells, until it amounts to about a gallon. The jelly thus formed is next dissolved in seven or eight gallons of the liquor to be fined. This solution, having the consistence of a sirup, is called "brewers' finings," and about a pint to a pint and a half is added to a barrel of ale or porter, or to a hogshead of cider or wine. The action of this depends upon the combination of the gelatine with the astringent matter (tannic acid) of the liquor, forming thereby an insoluble solid, which sinks to the bottom, and carries with it, like the coagulating albumen, the suspended matter; but as the flavor of malt liquors partly depends upon the astringents they contain, the F. affects the flavor; the astringents also help to preserve the liquor, and hence their removal is in this respect disadvantageous. Malt liquors thus fined do not "stand well on draught." The use of gelatine for F. red wines is objectional, as in most of these the astringent flavor is an esteemed quality, and therefore albumen is preferred.

Other methods of F. are adopted. Sugar of lead is sometimes added, and afterwards, one half its weight of sulphate of potash dissolved in water. By this means, an

insoluble sulphate of lead is precipitated, which in subsiding carries down other matters with it. This is a dangerous process, the salts of lead being poisonous. If properly conducted, the whole of the lead may be precipitated, but a casual mistake in the quantities might cause the death of many people. Ox-blood is used in the same manner as albumen and isinglass. Lime, alum, alcohol, and acids act by coagulating albumen, etc., contained in the liquor. Plaster of Paris, clay, and even sand, are sometimes used to carry down the suspended matters. A strip of isinglass or a piece of dried sole-skin is often used for F. coffee, and it acts in the manner above described. Liquors that are unusually difficult to fine are called "stubborn" by coopers and cellarmen.

FINISTERE, or **FINISTERRE** (Lat. *finis terræ*, "land's end"), a department at the western extremity of France, comprehending a part of the former duchy of Bretagne, has an area of 2648 sq. m., and a pop. (1891) of 727,012. It is traversed from e. to w. by two low but picturesque chains of hills. Its coast is very ragged and broken, its shores bristling with dangerous granite rocks, and fringed with many islands. The soil, one third of which is occupied by sandy tracts and marshes, is moderately productive; and, owing to the vicinity of the sea, which washes the northern, western, and southern shores of the department, the climate is mild and humid. Corn, hemp, and flax are grown in considerable quantities. In the valleys, smiling meadows everywhere occur. The silver and lead mines of F. are very valuable; those of Poullaouen and Huelgoet being about the richest in France. Its principal rivers are the Aulne, the Elorn, and the Odet. The first of these is connected by a canal with the Blavet, and forms part of the great line of communication by water from Brest to Nantes. This department is divided into the following five arrondissements: Quimper, Brest, Châteaulin, Morlaix, and Quimperlé. Quimper is the chief town.

FINISTERRE, **CAPE**, or **LAND'S END**, is the name given to a promontory at the n.w. extremity of Spain, in lat. 42° 54' n., and long. about 9° 20' west. It is the *Promontorium Nerium* of the ancients.

FINLAND (Fin. *Suomesimaa*, land of lakes and marshes) is a grand duchy of Russia, lying between 59° and 70° n. lat., and between 21° and 33° e. long., is about 750 m. from n. to s., and has an average breadth of about 185 miles. According to the Russian census of 1851, the pop. was 1,636,915, and it has maintained a pretty constant rate of increase; in 1894 it was 2,454,262. The area of F. may be estimated at about 145,000 sq. m., of which over 11 per cent. is occupied by lakes. The largest of these sheets of water, independently of Lake Ladoga, which belongs partly to the Russian province of Olonetz, are lakes Puruvesi, Payane, Enara, and Saima; the last of these, which is about 180 m. in length, constitutes a portion of the system of water-communication which has been established between the central parts of the country and the gulf of Finland. The lakes are especially numerous in the s.w. of F., where they are almost all united together by rivers and waterfalls, round the central lake of Pyhäjärvi. The surface is a table-land, from 400 to 600 ft. above the level of the sea, with occasional higher elevations. There are, however, no mountain-ranges, and hence the rivers are unimportant; but in the n. the country is intersected by a sandy ridge known as the "Maanselkæ," which merges, under the name of the Lapintunturit mountains, into the great Lappo-Norwegian Alpine chain. The coast-line is generally low, but to the s. it is skirted by numerous rocky islands, separated from the land by narrow channels, difficult of navigation, but well adapted for purposes of defense against hostile attacks from the sea. The principal geological formations are friable granite, hard limestone, and slate. The crown forests are very extensive and the government derives a considerable income from them. There are a large number of saw mills, with water motors and steam mills, giving employment to over 11,000 workers. Pine and fir predominate, but birch, beech, oak, etc., thrive in the southern part of the country, where some good pasture land is to be met with. Since the incorporation of Finland with Russia, the agricultural importance of the former country has declined, but on the other hand, fishing, cattle breeding, and the manufacturing industries have greatly advanced. Of the last named, the chief are the productions of iron and mechanical appliances, textiles, chemicals, leather, paper, beer, spirits, and articles of wood and bone. Of all these the wood and bone industries furnish employment to the largest number of workers, and had the largest output in 1893. The exports from Finland, in 1895, were 142,900,000 marks, and the imports some 8,000,000 marks in excess of this. The chief countries to which F. exported, in 1895, were, in the order of their importance, Russia, Great Britain, Denmark, France, and Sweden and Norway. The most valuable of the exports are the products of the forest, timber, pitch, potash, tar, and rosin. In timber alone the trade more than doubled between the years 1887 and 1895. As to grain, the supply is scarcely larger than the home demand. In fact a considerable part of the imports is made up of cereals. Yet at one time F. was regarded as the granary of Sweden, for barley and rye. These two cereals, together with oats, still constitute the chief crops. Few fruits ripen, except hardy berries, and in the extreme north vegetation is limited to mosses and liverworts. F. yields some copper, iron, lime, and slate. Between 1888 and 1894 there was a steady increase in the annual production of iron ore. Reindeer, wolves, elks, beavers, and various kinds of game abound, while numerous lakes and adjacent gulfs supply the inhabitants with an abundance of

salmon, herring, and other fish. The climate is rigorous, and winter, which lasts seven or eight months, is succeeded by a brief spring, which passes almost suddenly into a short, but hot summer of six or seven weeks, succeeded in its turn by a rainy season which ushers in the return of cold weather. The climate is subject to fluctuations, and the early frosts often do serious damage to the crops. In the n. the sun is absent during a part of Dec. and Jan. and almost perpetually above the horizon during the short summer.

For administrative purposes F. is divided into *laenes*, or governments, and ecclesiastically the country is included in the three dioceses of Abo, Borgo, and Kuopio. The predominant religion is the Lutheran, and, at the end of 1892, the members of this church numbered over 2½ millions. Next in importance is the Greek orthodox church whose members, together with the Raskolniks, numbered 45,826 at the end of 1892. There are also some hundreds of Roman Catholics, Methodists and Baptists. There is one university, founded in 1640 at Abo, but removed to the present capital, Helsingfors, in 1829. It is a flourishing institution with over 1800 students (1895). Lower education is well provided for, and only a very small portion of the children of school age receive no education. There are lyceums and pro-gymnasiums, most of which are supported by the state; real schools, higher primary schools, teachers' schools, commercial schools, and a variety of schools for technical training. Its constitution dates from the year 1772, but has been several times modified. In accordance with it there is a national parliament consisting of representatives chosen by each of the four estates, viz.:—nobles, clergy, burghers, and peasants. It is convoked by the Emperor of Russia, who is Grand Duke of Finland, and remains in session four months. The emperor proposes schemes of laws which are discussed by this body, and the emperor has the right of veto; but for all changes in the constitution and for the levying of new taxes, the unanimous consent of the four estates is necessary. The schemes of laws, proposed by the emperor as Grand Duke, are drawn up by a committee known as the State's Secretariat of Finland, which has its seat at St. Petersburg. The highest administrative authority is vested in the imperial senate, whose members are nominated by the emperor and presided over by the governor-general of Finland. It consists of two departments which control education, justice, police, posts, railways, canals, custom houses, etc.; and the courts. The military department is under the control of the Russian Ministry of War, and the department of foreign affairs is under the direction of the Russian chancellor.

The state has built, and at present owns, almost all the railways, there being out of the 1505 miles of railway open to traffic, in Jan., 1896, only 20 miles not in possession of the state. Until 1891 F. administered her own post-office, but in that year the postal system was placed under the control of the Russian Ministry of the Interior. The estimated revenue of F. in 1896 was 64,634,875 marks, which was balanced by the estimated expenditure. The chief item of expenditure was the civil administration; next came military affairs; and next, worship and education. Only citizens of F. are permitted to take part in its civil service. The army has the privilege to serve in distinct corps, without being incorporated in the general forces of the empire. According to official estimates, in 1894, it numbered 511 officers and 24,151 men. The naval force also forms a distinct squadron but under the Russian flag. F. has, too, its own monetary system. The standard is gold, and the unit of value is the *markka*, which is equivalent to about twenty cents of United States money (19.3 cents in 1896). By the law of Aug. 14, 1890, however, the acceptance of Russian paper roubles, and silver money in the course of trade, was made obligatory. At the end of 1892 the population of the chief towns of F. was as follows:—Helsingfors (including Sveaborg), 66,734; Abo, 32,184; Tammerfors, 22,169; Wiborg, 21,870; Uleaborg, 13,051; Björneborg, 10,468; and Nikolaistad (Wasa) 10,952. The others were under 10,000.

The early history of F. is shrouded in obscurity, and little is known of the people before the 12th c., when Eric the saint, king of Sweden, exasperated by their piratical inroads, undertook a crusade against them, and compelled them, by force of arms, to profess Christianity. The hold which the Swedes then acquired over the country was never wholly lost till 1809, when Sweden secured peace with Russia by the cession of all F. and the island of Åland; before that time, however, the Russians had at various epochs wrested portions of the Finnish territories from the Swedes, while F. had been for centuries the perpetual cause and scene of wars between the two nations. The Swedish language had taken such deep root in F., that the efforts of the Russian government to displace it in favor of the native Finnish, have hitherto met with only partial success, and in many parts of the country, the people still openly prefer their old masters. The inhabitants, who call themselves *Suomes*, and are denominated *Tschudeas* by the Russians, have, however, no affinity of race with the Swedes, and may be regarded as differing from all other European nations, excepting the Lapps and the Finmarkers, to whom they are very probably allied. See FINNS and FINNISH LITERATURE. For further information, see Gerschau, *Versuch einer Gesch. Finland* (1821); Stockfleth, *Bidrag til Kunds. om Finnerne i Norge*; Topelius, *Finland främställt i Teckning* (1860); *Zeitschrift der Gesellschaft für Erdkunde* (vol. vi., 1871). See illus., ETHNOLOGY, vol. V.

FINLAND, GULF OF, the eastern arm of the Baltic sea, between 22° and 30° e. long., and between 59° and 61° n. lat. Its coasts are entirely Russian territory. It receives the waters of the great lakes Onega and Ladoga. The water of the gulf is not deep, and only very slightly salt. The topography of the gulf of F. has been thoroughly elucidated by Struve.

FINLAY, GEORGE, LL.D., a distinguished historian, was b. in Faversham, England, of Scottish parents. Circumstances induced him to take up his residence in Athens, where he patiently and industriously devoted himself to the study of the later Greek history. The fruits of his labor and researches are contained in his *History of Greece under the Romans*, 146 B.C. to 717 A.D. (London, 1843; 2d ed. 1857); *History of Greece from its Conquest by the Crusaders to its Conquest by the Turks, and of the Empire of Trebizond*, 1204-1461 A.D. (London, 1851); *History of the Byzantine and Greek Empires*, 716-1453 A.D. (London, 2 vols. 1853-54); *History of Greece under the Othoman and Venetian Dominion* (1854); and *History of the Greek Revolution* (1861). F. is not regarded as a philosophical historian in the highest sense of the term; but from his earnest endeavors to obtain an accurate conception of the times about which he wrote, he was enabled to throw a flood of new light on modern Greek history. F. also exhibited a profound knowledge of Greek art, antiquities, and topography. In 1870 he edited Brue's *Journal of Ali Pacha's Campaign in 1715*. He died in 1875.

FINLAY, JOHN, 1782-1810; b. Glasgow; author; published a life of Cervantes, an edition of Adam Smith's *Wealth of Nations*, and *Scottish Historical and Romantic Ballads* (1808).

FINLEY, JOHN HUSTON, educator, b. La Salle co., Ill., Oct. 19, 1863; educated at Knox college and Johns Hopkins university; took a two-years' course at the university in history and politics; secretary of the New York state charities aid association, 1889-92; and became president of Knox college, 1892. He assisted Prof. Richard T. Ely (q.v.) in the preparation of *Taxation in American States and Cities*, was editor of *The Charities Review*, and contributed to periodical literature.

FINLEY, MARTHA, b. Ohio, 1828; author, widely known by her pen name of "Martha Farquharson." She was educated at South Bend, Ind.; published her first story in 1854; after living in Philadelphia and elsewhere (1853-76), removed to Elkton, Md. Among her works are the "Elsie Series" in many volumes, the "Mildred Series," *An Old-fashioned Boy*, *The Thorn in the Nest*, a novel, and more than 50 Sunday-school books.

FINLEY, SAMUEL, D.D., 1715-66; a native of Ireland; arrived in the United States in 1734, and became a Presbyterian minister in Philadelphia in 1740. For preaching in Connecticut in violation of a law which prohibited any person from preaching in the parishes of settled ministers without their consent, he was arrested as a vagrant and put out of the colony. In 1744, he was pastor and teacher of an academy in Maryland; in 1761, president of the college of New Jersey. His sermons have been published.

FINMARK, a province of Norway, and the most northern part of the continent of Europe, lying between 68° 30' and 71° n. lat., and 17° and 31° e. long., constitutes Norwegian Lapland (q.v.). Area about 18,300 sq.m., of which three fourths are occupied by the continent, the rest belonging to the numerous islands which skirt its n.w. shores, and terminate in the North cape. Innumerable fiords and bays indent the coast. The interior is intersected by a snow-covered range of mountains, reaching an elevation of 4,000 ft.; the line of perpetual snow being here less than 3,000 ft. above the level of the sea. Agriculture is impracticable above an elevation of 100 ft.; a few berries are the only fruits that ripen; and although barley, potatoes, and a few other vegetables thrive in some parts, fish and game constitute almost the sole food of the inhabitants. In the n., where no trees are to be found, the turf of the marshes affords a good supply of fuel. The thin vegetable mold which covers the stony soil yields grass for the sheep and cows, which graze on the declivities of the rocks skirting the fiords and creeks. The principal source of wealth is the reindeer in the n., and the cod fisheries in the south. The population, which in 1891 numbered 29,170, consists principally of Lapps (see LAPLAND), a people of Finnish origin. Hammerfest, the capital of F. (70° 40' n. lat.), is the most northern town of Europe, with a pop. '91, 2239.

FINNEY, a co. in southwestern Kansas, on the Arkansas river; organized in 1884, and reduced in area in 1887; 864 sq. m.; pop. '90, 3350. Co. seat, Garden City.

FINNEY, CHARLES GRANDISON, D. D., 1792-1875; born in Warren, Ct.; removed in childhood to Oneida co., N. Y. He went to a high-school in New England and studied there for some time, instead of entering college as he had wished to do. At a later period still, he acquired some knowledge of Latin, Hebrew, and Greek. In 1818, he commenced the study of law at Adams, Jefferson co., N. Y.; but soon felt it his duty to give up his life to religious teaching. After his license to preach, those revivals of religion at once began under his ministry which continued to be its great characteristic until its close. Revivals resulting in the conversion of thousands were witnessed at Evan's Mills, Antwerp, Gouverneur, De Kalb, Western, Rome, Utica, Auburn, Troy, Rochester, Buffalo, in the state of New York; at Wilmington, Del.; Philadelphia, Reading, Pa.; New York, Boston, Hartford, London, Edinburgh, Oberlin, O.; and many other places during a period of 50 years. In many of the places named the revivals were repeated, in different years, again and again. In 1835 the college and theological seminary at Oberlin, O., were founded, with Mr. Finney as professor of theology and pastor of the college church. After 1860, Mr. Finney's strength being no longer equal to the extra labor abroad, he continued to work at home with great energy and success. In 1872 he resigned the pastoral office at Oberlin, but persevered in his

labors in the seminary, where, having completed his last course of lectures in July, 1875, he died. His most important published works are: *Guide to the Saviour*; *Lectures to Professing Christians*; *Lectures on Revivals of Religion*; *Sermons on Important Subjects*; *Systematic Theology*; and an *Autobiography*, published after his death.

FINNISH LANGUAGE AND LITERATURE. The Finnish language is used by the people known as Finns, inhabiting Finland, or dispersed throughout Lapland, the Baltic provinces, parts of Russia proper, both banks of the middle Volga, through Perm, Vologda, West Siberia, and Hungary, and constituting the western branch of the great Uralo-Altaic family. There are five groups: 1. The Finns proper; 2. The Lapps; 3. The Peruvian Finns; 4. Volga Finns; 5. Ugrian Finns. 1. The first group comprises the Suomi or Suomelaisset, i.e., Finn men, who occupy nearly all Finland except a portion on the gulf of Bothnia, where Swedish is spoken; next, the Karelians, who extend from Russian Lapland s. to the gulf of Finland and lake Ladoga, and e. to the White sea and the shores of lake Onega; thirdly, the Chudic, a Slav term often applied to the whole group, but now restricted to the Veps, or northern Chud, and the Votic or southern Chud, dwelling in scattered communities on the shores of lake Onega; and lastly, the Baltic Finns, including the Esthe or Esthonian, occupying the greater part of the southern coast of the gulf of Finland and the northern half of Livonia, and the Livonian or Krevinian, occupying a small corner in the n.w. of Courland. 2. The Lapps occupy the extreme n.w. of Russia, and some parts of northern Sweden and Norway. 3. The Permian Finns comprise the Siryenians, occupying an extensive region between 60° n. and the Arctic circle, and 50° e. and the Ural mountains, but mainly in the section of the government of Vologda; the Permian proper, formerly diffused throughout Perm, Viaska, Oufa, etc., now surviving in isolated communities mainly about the upper Kama; and the Votyak, occupying a relatively compact territory in Viatka as far n. as Glazov on the river Tchepsa. 4. The Volga Finns include the Cheremissian on the left bank of the Volga, from a little w. of Kasan to near Nijni-Novgorod; and the Nordvinian, divided into small communities on both banks of the Volga, about Simbirsk, Samara, Stavropot, and Tambar. 5. The Ugrian Finns include the Voguls, extending from the Ural mountains e. to near the river Obi, and s. to Tobolsk; the Ostyaks, from the Voguls e. to the river Yenissei, between Turuchausk and Yenisseisk, and from the Arctic circle to 59° n.; and the Magyars of Hungary. These five groups form one linguistic family, to which Samoyede is related. The richest and most highly cultivated languages of the family are the Suomi and Magyar. The dialects are all distinctly agglutinative forms of speech, with decided tendencies towards true inflection, so much so that in many grammatical endings the essential difference between agglutination and inflection becomes obscured. As in other Ural-Altaic tongues, progressive vowel-harmony forms a characteristic feature of the Finnish group. Rask considered the Finnish language the most sonorous and harmonious of tongues. It is maintained by some that the Finnish languages represent the oldest forms among the Ural-Altaic groups. There is strong evidence that the Finns, or a closely allied race, must have at one time, probably prehistoric, been spread over a considerable area of central, if not of western Europe. The Finnish language is spoken by over 2,000,000 people, and in three different dialects, viz., the East Finnish or Karelian, the South Finnish, and the West Finnish. The first of these is the oldest and least developed; the second is the main vehicle of Finnish literature. It is emphatically vocalic. It has five fundamental vowels—a, e, i, o, and u—and employs 12 diphthongs. The grammatical relations between the several parts of speech are expressed exclusively by suffixes. Nouns are used without any article; have no gender; and are declined, both in singular and plural, through 15 different cases, so as to express the relations which in the Indo-Germanic languages are sometimes indicated by prepositions. Verbs have but two tenses, present and past, the future tense being expressed by a circumlocution; but their conjugation is very intricate. The language is capable of expressing the nicest shades of meaning. See Eliot's *Finnish Grammar* (Oxford, 1889).

The chief monument of Finnish literature is the *Kalevala*, a sort of epic poem, which, until the present century, existed only in the memory and on the lips of the peasantry. A collection of some of the scattered parts of this poem was published in 1822 by Zacharias Topelius, but Elias Lönnrot, 13 years later, published a far more complete collection. Dr. Lönnrot wandered from place to place among the peasantry, living with them and taking down from their lips all that they knew of their popular songs. After unwearied diligence in his researches, he was successful in collecting 12,000 lines, which he arranged into 32 runes or cantos, and published exactly as he heard them sung or chanted. Continuing his researches, he published in 1849 a new edition of 22,793 verses, in 50 runes. The importance of this long-hidden epic was at once recognized in Europe, and translations of it were made in several languages. Some specimens of it were translated into English by Prof. Porter, of Yale, and published in New York in 1868. The poem is written in eight-syllabled trochaic verse, and an idea of its style may be obtained from Longfellow's *Hiawatha*, which approaches a true imitation of the Finnish epic. Prof. Max Müller bears emphatic testimony to the merits of this ancient poem. "It is," he says, "equal to the *Iliad* in length and completeness; nay—if we can forget for a moment all that we in our youth learned to call

beautiful—not less beautiful. *Kalevala* will claim its place as the fifth national epic of the world, side by side with the Ionian songs, with the *Mahābhārata*, the *Shahnamah*, and the *Nibelunge*.” The *Kalevala* is concerned entirely with the mythology or folklore of the people. In the story there is a certain unity of plot, though the various parts are not perfectly homogeneous, and appear to be the product of different minds at different periods, the various songs having evidently received additions in course of time. They probably originated before the Finns were converted to Christianity, and when they were not scattered as they are now. When Dr. Lönnrot collected the *Kalevala* songs, he also gathered a considerable quantity of lyric poetry, which he published under the name of *Kanteletar*, from the name of the national instrument to which they are sung—a species of harp with five strings. Of recent Finnish poets, the most popular seems to be Paavo Korhoinen, a peasant, a very sarcastic writer. Other modern poets are Marteska, Kettunen, Ilhainen, Oksaselta. The Finns abound in proverbs, Lönnrot having published a collection of upwards of 7,000, with about 200 charades, while considerable collections of legends and tales have been published. The first printed book in Finnish was probably the *Abecedarium* of Michael Agricola, bishop of Abo, which appeared in the middle of the 16th century. A translation of the New Testament by the same bishop appeared in 1548, at Stockholm. The whole Bible was not translated into Finnish till 1642. During the last and present centuries there has been considerable literary activity in Finland, and books in almost every branch of research are found in the language, mainly translations or adaptations. At the Paris international exhibition of 1878, several native Finnish painters and sculptors exhibited works which would do credit to any country. Finland is rich in periodicals of all kinds, the publications of the Finnish societies of literature and of the sciences and other learned bodies being specially valuable. Works on Finnish history and geography are quite numerous. In language we have Donner’s Comparative Dictionary of the Finno-Ugric Languages. (Leip. 1885.) To Elias Lönnrot of Helsingfors belongs the merit of having rescued from utter oblivion some of the numerous sagas and songs which had for ages been recited by the Finnish *runolainen*, or singers, to the sound of the *kantela*, or harp, and thus transmitted from one generation to another. Although his researches were limited to the district of Karelia, in the government of Kupio, he obtained numerous songs and proverbs, and a complete epos, consisting of 32 parts, each of which contained from 200 to 700 verses. This singular monument of the earlier culture of the people was published by him in 1835, under the title of *Kalevala* (the ancient name of Finland), but it met with little notice till the academy of Dorpat made it the subject of discussion at their meetings in 1840. This publicity soon attracted the attention of foreign philologists, and led to its translation into Russian, Swedish, and German. The learned Finnish scholar, Carsten, the Grimms, and Brockhaus, agree in regarding the *Kalevala* as a pure epic, and characterize it as a composition possessing a thoroughly oriental appreciation of nature, an almost unparalleled wealth of images and tropes, great flexibility of rhythm, and a copiousness of synonyms not to be met with in any other northern tongue. There is less unanimity in regard to the character of the plot, for while one critic believes that the incidents refer to definite historical epochs, another regards them as purely allegorical. But whatever discrepancy of opinion there may be in this respect, the *Kalevala* is admitted by all who are entitled to form a judgment of its merits, to be one of the most curious monuments of the kind possessed by any European people. The date of its composition must be referred to a period anterior to the introduction of Christianity amongst the Finns in the 14th c., while there is even strong internal evidence, from an identity of the names and traditions of the *Kalevala* with many still current in Esthonia, that the poems very probably belong to an epoch anterior to the immigrations of the Karelians into the districts which they now occupy. The publication of the *Kalevala* has given a powerful impetus to the study of the Finnish language, which the Russian government effectively sustains by encouraging the cultivation and use of their native tongue by the Finlanders. The upper classes still cling to the use of Swedish, but the peasantry and small landed proprietors welcome with avidity every addition to the limited stock of their printed literature. Finnish weekly papers circulate freely among them, and political questions are discussed with an enthusiasm which is never met with among similar classes in Scandinavia or Russia proper, but which affords additional proof of the diversity of character which distinguishes the Finn from either of the neighboring nations with which he has been successively incorporated.

The prose literature of Finland is almost exclusively devoted to religious and moral subjects. The Bible was translated into Finnish in 1642, but a part of the Old Testament had been translated a century earlier. Several Finnish poets have acquired a reputation of late years, but their works breathe the same melancholy tone which so strongly characterizes the more ancient poems of Finland. Lönnrot has made a collection of about 7,000 proverbs (*Suomen kansan Sanalskuja*, 1842), and about 2,000 charades (*Suom. kans. arvoituskia*, 1851). See Erman’s *Archiv f. d. Kunde v. Russland. Tengström i Fosterländskt Alb.* (Helsingf.).

FINNS, geographically, the name of the inhabitants of Finland; but in ethnology, that of a considerable branch of the Ugrian race, dwelling for the most part in Finland,

though with some representatives in Sweden and Norway as well. The Ugrians have been classed among the nations said to have a Mongolian origin. Dr. Latham places them among the "Turanian Altaic Mongolidæ," and divides them into Ugrians of the east, and Ugrians of the west. The western Ugrians consist of Lapps, Finns, Permians, and other nations or tribes in the n. and n.w. of Russia, and of the Magyars in Hungary. The Magyars are the most numerous, and next after these come the F., comprising about 2,000,000 of individuals. All the other tribes of western Ugrians do not together comprise so many. The F., in common with the other Ugrians, are of the Mongolian type. A traveler, the late Mr. Bayard Taylor, describes them as having "high cheek-bones, square, strong jaws, full, yet firm lips, low broad foreheads, dark eyes and hair, and a deeper, warmer red on the cheeks than on those of the rosy Swedes. The average height is, perhaps, not quite equal to that of the latter race, but in physical vigor there is no inferiority, and there are among them many men of splendid stature, strength, and proportion." Other travelers bear similar testimony to the physical appearance of the F. proper, or those of pure Finnish blood; but although these form the majority, there are many, in the towns especially, who pass for F., while, in reality, they are quite as much entitled to be called Swedes, or even Russians, on account of the frequent intermarriages of the F. with individuals of those two nations. The F., from having been originally a nomadic race, have for many centuries been stationary and civilized. Long before the arrival of the German and Slavic nations in the n. of Europe, the Ugrians, or *Ogres* (for the name so common in fiction is really of historic origin), possessed it, and were gradually pushed further n. and e. by the new invaders. Both F. and Lapps, there is good reason to believe, originally extended much further s. than they do at present, occupying, perhaps, the whole of Sweden and Norway. "The Finns," says Prichard, "were, in the time of Tacitus, as savage as the Lapps; but the former, during the succeeding ages, became so far civilized as to exchange a nomadic life for one of agricultural pursuits; while the Lapps have ever continued to be barbarous nomades, as well as the Siberian tribes of the same race—namely, the Woguls and Ostiaks. The Finns, as well as their brethren the Beormahs, or Finns of the White sea, had probably undergone this change long before the time when they were visited by Otther, the guest of Alfred. When the Finns were conquered by the Swedes, they had long been a settled people, but one of curious, and singular, and isolated character."

The Finnish language, like that of the other Ugrian nations, belongs to the Turanian family of languages, and hence offers some striking points of resemblance to the languages and dialects of the Turks, Tartars, Mongols, Mandshurians, Tungusians, and even Magyars or Hungarians. In Finnish, the nouns are not inflected, but an additional word is required to denote the variations of case, number, and sex. The prepositions and pronominals are suffixed to the words they modify. The verbs have only two tenses, past and present; the future being expressed by adding to the present some word indicating a future action or state of being. Rask considers the Finnish to be the most harmonious of tongues. Many Swedish, and a few Russian words have, of course, become incorporated with the language, in consequence of the social and political relations of the F. with those two countries. The F. of our time are doubtless the same race as the *Fenni* of Tacitus, and the *Phinnoi* of Strabo and Ptolemy, though not occupying the same geographical area. "The nearest approach to a name at once general and native," says Dr. Latham, "is *Suomelainen*, meaning swamp, morass, or fen people; the term *Finn* and *Finlander* being of foreign origin." With respect to the social habits, morals, and manners of the F., all travelers are unanimous in praising them. They are of a cheerful disposition, affectionate towards each other, and honest and honorable in their dealings with strangers. They are also cleanly in their persons, being much addicted to the use of the vapor-bath, to which circumstance may be attributed the strongly marked difference in physical appearance between them and the stunted Lapps, to whom, in language as well as many other respects, they stand closely related.

FINS (allied to Lat. *pinna* or *penna*, see letter F), organs adapted for swimming or locomotion in water. The limits of the application of the term are rather vague. It is always applied to the locomotive organs of fishes, when they possess special organs of locomotion, as almost all of them do; and equally to those organs (the pectoral and ventral fins) which are homologous to the limbs of other vertebrate animals, and to those (the vertical fins) which may be said to be superadded to them, and to belong to fishes alone; equally also to those which are furnished with rays, having a membrane stretched on them, as is generally the case in all the F. of fishes, and to those which consist, as in some fishes, of a mere fold of the skin, and which, when they exist in fishes, are in reality not very much organs of locomotion. The name F. is given to the locomotive organs of *cetacea*, but not to those of any other *mammalia*, even when, as in the case of the hind-feet of seals, they approach very nearly to the character of the F. of fishes. Nor is it ever given to the webbed feet of birds. But it is often given to the swimming organs of invertebrate animals, as to the expansions of the mantle which serve this purpose in the *cephalopoda*, and which are entirely destitute of rays.

FINSBURY, or **FEN TOWN**, a parliamentary borough of Middlesex, forming the n. part of London (q. v.).

FINSCALE. See **RED-EYE**.

FINSTERAARHORN, the highest peak of the Bernese Alps. See **ALPS**.

FINSTERWALDE, a small t. of Prussia, in the province of Brandenburg, is situated on an affluent of the Black Elster, 40 m. n. of Dresden. It has manufactures of cloth and machinery; spinning and weaving are carried on. Pop. '85, 7566.

FIORD, or **FJORD** (Scandinavian), an inlet of the sea or a narrow bay indenting the coast and penetrating deeply into the interior. The most notable fiords are on the coast of Norway, the longest of which is the Sogne Fiord, extending through the country for the distance of 100 miles, and shut in throughout its entire length by high and precipitous rocky walls. Hardly less important are the fiord of Christiania (90 miles) and Throndhjem Fiord (80 miles). The coasts of Iceland and Greenland, of Chile and around Cape Horn, of North-western America and parts of New Zealand are marked by similar inlets. Their courses often lie through wild and picturesque scenery and are generally the continuations of mountain valleys. In many cases the beds consist of chasms excavated by glaciers, and many indications of the presence of former glacial conditions are discernible throughout the regions which they intersect.

FIORIN. See **BENT GRASS**.

FIORITURE (flowerets), the Italian name for ornaments introduced by singers into arias.

FIR, a name often used in a sense coextensive with the widest sense of the word Pine (q.v.), and therefore so as to include a large portion of the Coniferæ (q.v.), or at least the whole of the Linnæan genus *pinus*. But the name F. is often also used in a more restricted signification, and the trees so designated are those forming the genus *abies* of some authors, *abies* and *picea* of others, which the greater number of botanists have now agreed in separating from *pinus*. The **SCOTCH FIR**, however, is a true pine (*pinus sylvestris*), and will be described along with its congeners. See **PINE**.—The genus *abies* is distinguished from *pinus* by the flat rounded apex of the scales of its cones, and by leaves not in clusters of definite number. Some botanists include the species of larch (q.v.) and cedar (q.v.) in the genus *abies*; but if these be separated, no species with clustered leaves remain in this genus, which then contains only the different kinds of **SPRUCE FIR** and of **SILVER FIR**, or species most nearly allied to those which ordinarily bear these names. All of them are evergreen. The spruce firs form the genus *abies* of some authors, distinguished by short solitary leaves, scattered all round the branchlets, and by the scales of the (pendulous) cones being attenuated at the apex, and remaining fixed to the axis of the cone. The silver firs form the genus *picea* of some, distinguished by the deciduous scales of the (erect) cones. It being supposed, however, that the Linnæan names had been given through mistake, and that the common silver fir is the true *abies* of the ancients, and the Norway spruce their *picea*, Link has attempted, but without being followed by many, to restore these names to their ancient use, and to denominate the genera accordingly. The **NORWAY SPRUCE** (*abies excelsa* or *pinus abies*) is a noble tree, sometimes attaining the height of 180 ft., with long cylindrical pendulous cones, denticulate scales, and scattered, green, crowded, suddenly pointed, almost quadrangular leaves. See illustration, **CONIFERE**, vol. IV., fig. 4. It is the *Fichte* of the Germans, called also *Rothtanne* or *Schwarzanne*. Like the other kinds both of spruce and silver fir, it exhibits the peculiar character of the *coniferæ* more perfectly than many of the true pines do, in its perfectly erect stem, from which proceed almost whorled horizontal branches. It is a very beautiful pyramidal tree, and when old, its long branches droop towards the ground. It forms entire forests in the middle and n. of Europe and in Asia, chiefly upon elevated ridges, although it prefers moist places. It loves districts of primitive rock. In some places, it is found even within the arctic circle. It is not a native of Britain, but has long been very generally planted, although too often it is merely made a nurse for other trees, and is not allowed to attain a considerable age or size. It is of rapid growth, but is believed to live to the age of 400 years. It yields the same products as the Scotch fir, resin, turpentine, tar, and lampblack (see these heads); but more resin than turpentine. The true spruce resin flows spontaneously from the bark. The purest pieces are whitish or pale yellow, are sold under the name of common **FRANKINCENSE**, and used for ointments and plasters, and when melted yield the common Burgundy pitch (q.v.). The bark of the spruce is a good and cheap non-conductor of heat; the cones are an excellent substitute for tanners' bark. In Sweden and Norway, the inner bark is made into baskets; and the long and slender roots, split and boiled with alkali and sea-salt, are dried, and twisted into cordage, which is used both for vessels and by farmers. The wood is used for fuel and for house-building; it also supplies masts and spars for ships. It is the **WHITE CHRISTIANIA DEAL** and **DANZIG DEAL** of the market, and is very largely imported into Britain from Norway and the Baltic. It is whiter, lighter, less resinous, and more elastic than the timber of Scotch fir. The sapwood, whilst still in a gelatinous state, is sweet, and is eaten fresh in Sweden and Lapland; and the inner bark, in times of scarcity, is mixed with a little flour or meal of some kind, and baked into bread. The young shoots, still covered with their bud-scales, are in many parts of Europe used for fumigation. The leaf-buds are also employed medicinally in cases of scurvy, rheumatism, and gout. The pollen is often sold by apothecaries instead of the dust of the clubmoss or *Lycopodium*.—A very superior

variety of this F. is known as the RED NORWAY SPRUCE. Dwarf varieties are cultivated amongst ornamental shrubs.—The BLACK SPRUCE (*Abies nigra*), of which the RED SPRUCE (sometimes called *A. rubra*) is regarded as a mere variety caused by difference of soil, and the WHITE SPRUCE (*A. alba*), form great woods in North America. The black spruce is found as far n. as lat. 65°. Both species are now common in plantations in Britain. Both have quadrangular leaves; those of the black spruce are of a dark glaucous green, those of the white spruce are of a lighter color. The cones of the black spruce are short, ovate-oblong, obtuse, and pendulous, with rounded scales ragged at the edge; those of the white spruce are oval, and tapering to a point with entire scales. The black spruce is a valuable timber tree, supplying yards of ships, etc., but its planks are apt to split. The white spruce is smaller, and the timber inferior. From the black spruce the *essence of spruce* is obtained, which is so useful as an antiscorbutic in long voyages, and is used for making spruce-beer. Spruce-beer is also made by adding molasses or maple sugar to a decoction of the young branchlets, and allowing the whole to ferment. From the fibres of the root of the white spruce, macerated in water, the Canadians prepare the thread with which they sew their birch-bark canoes; and the seams are made water-tight with its resin.—From the twigs of the ORIENTAL FIR (*A. Orientalis*), a native of the Levant, a very fine clear resin exudes, which is known by the name of SAPINDUS' TEARS. This F. has a very short quadrangular leaves, densely crowded, and uniformly imbricated.—The HEMLOCK SPRUCE of North America (*A. Canadensis*) forms great part of the forests of Canada and of the northern states of America, extending northwards as far as Hudson's bay. Its timber is not much esteemed, as it splits very obliquely, and decays rapidly in the atmosphere; but the bark is valued for tanning. The leaves are two-rowed, flat, and obtuse. The cones are scarcely longer than the leaves. The young trees have a very graceful appearance, but the older ones are generally much disfigured by remaining stumps of their lower branches.—*A. dumosa* of Nepal is very much allied to the hemlock spruce.—*A. Douglasii* is a noble tree, attaining a height of 250 ft., which forms immense forests in the n. w. of America, from lat. 43° to lat. 52°. The bark, when the tree is old, is rugged, and 6 to 9 in. thick. It abounds in a clear, yellow resin. The timber is heavy, firm, and valuable; the growth very rapid.—*A. Menziesii*, a native of North California, very similar to *A. Douglasii* in general appearance, also produces timber of excellent quality.—*A. brunniana*, a Himalayan species, forms a stately blunt pyramid of 120 to 150 ft. in height, with branches spreading like the cedar, and drooping gracefully on all sides. It is found only at considerable elevations. The wood is not durable, but the bark is very useful.—The KHUTROW or HIMALAYAN SPRUCE (*A. Smithiana*, called also *A. morinda* and *A. khutrow*) much resembles the Norway spruce, but has longer and more pendulous branches. The wood is white, and not highly esteemed, although it readily splits into planks.—The MOUNT ENOS FIR (*A. Cephalonica*), a native of Cephalonia, attaining a height of 60 ft., and a diameter of three ft., yields durable and very valuable timber.—All these species have been introduced into Britain, and some of them seem likely soon to be pretty common in our plantations, as well as others from the n. w. of America and from the mountains of Asia, as *A. Wittmanniana*, etc., noble trees, and apparently quite suitable to the climate.—The common SILVER FIR (*Picea pectinata*, or *abies* or *pinus picea*) has erect cylindrical cones, 5 to 6 in. long, and two-rowed leaves, with two white lines upon the under side. It forms considerable woods upon the mountains of central Europe and of the n. of Asia, and attains a height of 150 to 180 ft., and an age of 300 years. It is not a native of Britain, but large trees are now to be seen in very many places. The wood is white, contains little resin, is very soft and light, and is employed for the ordinary purposes of coopers, turners, and joiners, and in ship and house carpentry, also for making band-boxes and for many fine purposes, especially for the sounding-boards of musical instruments. The same resinous and oily products are obtained from the silver F. as from the spruce and Scotch F. but of superior quality. It yields the beautiful clear turpentine known as Strasburg turpentine. Very similar to the silver F., but generally of much smaller size, and indeed seldom much above 30 ft. in height, is the BALM OF GILEAD FIR (*Picea* or *abies balsamea*), a native of North America from Virginia to Canada. The wood is of little value, but the tree yields Canada balsam (q. v.). Besides these, a number of other species of *picea* are found in the western parts of North America and in the Himalaya, some of which are trees of great magnitude, and yielding excellent timber, as *P. grandis*, a California tree of 170 to 200 ft. in height—*P. amabilis*, a species much resembling it—*P. nobilis*, a majestic tree, which forms vast forests on the mountains of northern California—*P. bracteata*, a Californian species remarkable for its slender stem, which rises to a height of 120 ft., and yet is only about one foot in diameter at the base, and likewise for the manner in which the middle lobe of each bractea of its cones is produced so as to resemble a leaf—*P. Webbiana*, the HIMALAYAN SILVER FIR, which in its native regions, fills the upper parts of mountain valleys, and crowns summits and ridges at an elevation of upwards of 10,000 ft., a tree of great size, 35 ft. in girth, and with a trunk rising 40 ft. before it sends out a branch. Most of these have been introduced into Britain with good prospect of their succeeding well in our climate, and other species, as *P. pichtha*, a native of the Altai mountains, very nearly resembling the silver F., *P. nordmanniana*, *P. Fraserii*, etc.—*P. religiosa* is a tall and elegant tree, a native of the mountains of Mexico, with

slender branches, which are very much used by the Mexicans for adorning churches, and cones shorter than those of any other silver fir. *P. jezoensis* is a new species introduced from Japan. *A. bracteata* is a rare species found in California. For illus. of cross-section of fir-wood, see BOTANY, vol. II., fig. 1; also see CONIFERÆ, vol. IV.

FIRBOLGS, the name given in the fabulous early history of Ireland to a tribe said to, have descended from the Nemedians, who, under their leader Nemedius, landed in the island about 2260 B.C.; and after 217 years, left it, on account of the oppression to which they were subjected by pirates called the Fomorian. The emigrating Nemedians formed three bands—one went to Thrace, and from them descended the F.; a second to the n. of Europe or Lochlan, from whom descended the Tuatha de Danann; and the third to Alban or Scotland, from whom sprung the Britons. The F. returned to Ireland in three tribes, one of which more especially bore the name Firbolg; the others were called Firdomnan, and Firgailian. The three tribes, however, were under five leaders, by whom Ireland was divided into five provinces. With Slainge, the first Firbolg king, who began to reign 1934 B.C., and reigned only one year, the Irish historians begin their account of the Irish monarchy and list of kings. The F. were driven out, after they had been thirty-six years in Ireland, by their kinsmen, the Tuatha de Danann, from Scotland, they having previously passed over to that country from Lochlan; and these, in their turn, were expelled or conquered by the Milesians. Recent investigators of the early history of Ireland regard the story as having some basis of truth. See IRELAND.

FIRDUSI, **FIRDOWSI** (TUSI), **ABU'L-KASIM MANSUR**, the greatest epic poet of Persia, was b. between 304–328 H., or 916–940 A.D., at Shadab or Rizvan, near Tus in Khorasan. Whether the name F. (from *firdus*, garden, paradise) was given to him because his father (Fachreddin Ahmad) was a gardener, or on account of the “paradise of poetry” which he had created, is matter of controversy. All that is known of his early life is, that when a boy he was very industrious, and also that “he loved to sit for days alone on the bank of a river.” At the age of between thirty and forty, he went to Gazueh, where Mahmud de Gaznawide, a great admirer and patron of poetry and the arts generally, then resided. Erelong, F. had an opportunity of displaying both his talent and his extraordinary knowledge of ancient Persian history and legendary lore before the sultan himself, who was so pleased with an episode (the story of Sijavush) written by him at his majesty's order, that he at once paid him a gold dirhem for each couplet, and shortly afterwards sent him a great number of fragmentary ancient chronicles and histories of Persia, that he might versify them, and thus carry out the task once attempted by Dakiki—viz., to write a poetical history of the Persian kings from the creation of the world to the end of the Sassanide dynasty (636 A.D.)—the reward to be a dirhem a line. F. spent thirty years over the work, and produced the famous *Book of Kings* (*Shah Nameh*), consisting of 60,000 double lines. Without going so far as many critics have gone, we may fairly rank it among the greatest epics of all nations: the *Iliad*, the *Mahabharata*, the *Nibelungen*. Truth and fiction, history and fairy lore, all the most gorgeous imagery of the east and its quaintest conceits, together with the homeliest and most touching descriptions of human joy and human sorrow, of valor and of love, the poet has formed into one glowing song. Though abounding—in strict adherence to its sources—in impossibilities and anachronisms (such as Alexander the great being a Christian, Ki-Khosroo holding the Zend Avesta in his hands—some hundred and twenty years before it was brought to light—Abraham being Zerdusht, etc.), it yet contains not a little that is of real historical value, quite apart from its being the most faithful mirror of its own times. See **SHAH NAMEH**. But while F. was “weaving his poetical carpet,” his enemies had not been idle. Unable to attack his genius and his honesty, they attacked his religious opinions; and the sultan, influenced by bigotry and avarice, sent the poet, instead of 60,000 dirhems of gold, so many dirhems of silver. F. was at a public bath when the messenger arrived with the money, and on discovering that it was silver, and not gold, Mahmud had sent him, he divided the amount into three portions, and gave one to the attendant at the bath, another to the messenger, and the third to a man who brought him a glass of sherbet. He then burned several thousand verses which he had written in praise of the sultan, as sequel to the *Shah Nameh*, and composed one of the bitterest satires against him, which he handed over, well sealed, to the king's favorite slave, to give it to him when he might be seized with one of his fits of despondency, as it contained a beautiful panegyric on him. Dreading the sultan's rage, he fled precipitately, first to Tus; persecuted here, he next went to Bagdad, where Kadir Billah, the caliph, received him with all honor. But the unrelenting anger of Mahmud followed him thither, and he removed to Tabaristan, whence again he had to leave, to seek another place of refuge. After eleven years of restless wanderings, he was at last allowed to return to his native place, a broken, wretched old man. Mahmud is said to have repented his cruelty at last, and to have sent a caravan loaded with the costliest goods to F., to entreat his forgiveness, and induce him to become once more the star of his court. But while the king's messengers entered one gate of the city, F.'s bier was carried out to his last abode by the other, 1020 A.D. (411 H.). His only daughter—an only son of his had died long before him at the age of 37 years—

refused the sultan's present, and certain buildings were erected instead, in honor of the dead poet.

The great popularity which the *Shah Nameh* has always enjoyed in the east, is to a certain amount also the cause of the uncritical state of the texts. Every transcriber shaped and molded certain passages, or even episodes, according to his own fancy, so that not two out of the innumerable copies are quite alike. Nor are the 60,000 couplets extant in any one instance, the utmost number, including all the most palpable interpolations, never exceeding 56,600. The first complete edition of the text, with a glossary and introduction, was published by Turner Macan (Calcutta, 1829, 4 vols.). Another edition, with a French translation, was published by Mohl (Paris, 1840, etc.). Champron published some English extracts in 1788. F. also wrote another poem, *Yusuf and Zuleikha*, which has been edited by Morley, and a *Divân*, or collection of poems. Many European orientalists have written on F.; among others, Hammer, Wahl, Görres, Schack, Rückert, Morley, Ouseley, Atkinson, Nasarianz, etc.

FIRE. For the superstitions connected with fire, see BELTEIN, NEED-FIRE, and SUN AND FIRE WORSHIP.

FIRE. Whether a tribe of men ignorant of fire and its uses has ever existed, is a question in dispute among historians and travelers. It will be enough to say that absolute proof of the existence of such a tribe has not been presented, though there are many well authenticated facts and circumstances that suggest its possibility. The uses and dangers of fire, and to a certain extent the means of controlling it, must have been generally understood at a very early age. At first it may have been simply an object of terror, but probably men soon discovered that it was a friend no less than an enemy. Concussion or friction was undoubtedly the earliest method employed for producing fire. In the process of chipping stone, sparks were elicited, which, falling upon combustible substances, may have taught men how to produce a blaze at pleasure. The concussion of flint and steel was for ages doubtless the common method of kindling a fire, and it has not yet been entirely superseded. The Alaskans strike together two pieces of quartz, rubbed with sulphur, thereby setting the sulphur on fire, and then transfer the flame to a heap of dry grass. The Esquimaux use quartz and iron pyrites. In some countries sparks are produced by striking a piece of broken china upon bamboo; in Cochín China two pieces of bamboo are used, the silicious character of the outside layer of this wood rendering it as good as native flint. Numerous mechanical devices, for increasing by rapidity of motion the friction of different woods, were resorted to. In some cases a stick was rubbed backwards and forwards; in others it was made to rotate rapidly in a round hole in a stationary piece of wood. This method was used by the North American Indians, who improved it by applying the principle of the bow-drill. The Iroquois used the still more ingenious pump-drill. The production of fire by concentrating the rays of the sun by means of a burning-glass was well known to the ancients. North American legends narrate how the great buffalo, careering through the plains, makes sparks flit in the night, and sets the prairie ablaze by his hoofs hitting the rocks. The same idea appears in the Hindu mythology. To save the labor required in these initial processes of procuring light, and to avoid the inconvenience of carrying it about continually, primitive men hit on the expedient of a fire which should burn night and day in a public building. The Egyptians had one in every temple, the Greeks, Latins, and Persians in all towns and villages. Of these the "eternal-lamps" in the Byzantine and Catholic churches may be the survival. Even the functions of the state itself, according to some eminent writers, appear to have grown out of the care bestowed on the tribal fire. The first guardians of this fire, it is said, were the earliest public servants, who by degrees appropriated all important offices, as the state itself developed into a vast aggregation of interests. The men who in the Roman empire took charge of the tribal fire were called the prytanes. They were fed at the public expense, and they became magistrates, in whom were combined the powers of captain, priest, and king. When Augustus usurped the authority of emperor, he assumed the powers which belonged to a board of flamens, or of prytanes. He made himself pontifex maximus and assumed the charge of the public fire. The Hellenic nations, as well as the Aztecs, received their ambassadors in their temples of fire, where, as at the national hearth, they feasted the foreign guests. The prytæneion and the state were convertible terms. If by chance the fire in the Roman temple of Vesta was extinguished, all tribunals, all public or private business had to stop immediately. No Greek or Roman army crossed the frontier without carrying an altar where the fire taken from the prytæneion burned night and day. Greek colonies went not forth without living coals from the altar of Hestia, to light in their new country a fire like that burning at the old home. Architecture, it is supposed, began with the creation of sacred sheds to protect the sacred fire, which was looked upon as a divinity. The fire that burned in the temple of Vesta was regarded as the very goddess herself. The hearth fire was kept hoïy, its flame was to remain bright and pure. According to the Zend Avesta nothing unclean was to be thrown into the fire, and no indecent actions are to be committed before it. To spit in one's fire would be considered in some places an unpardonable offense. Some people were so reverent that they would not blow out a light lest they should render the flame impure with their breath. In the course of time, the same

reasons which led to the provision for a tribal fire induced every family to have its hearth. The family developed itself only after the married pair and their offspring had their own fire-place. This family fire was at first the privilege of only the aristocracy. The hearth was the very center of the house, as the regia was the sacred center of Rome and the Roman commonwealth; around the regia the civic and politic institutions developed themselves; and around the hearth the family grew slowly into shape and power. Let us hope it may not decline under the influence of those "modern improvements" which have superseded the hearth-stone and banished from sight the household fire. The Gentile hearth gave a recognized asylum—a right still in full vigor in some countries. The proud saying of the Englishman that his home is his castle is a remnant of this old feeling. According to the ancient belief the soul and the fire were identical. As the sun gave life to the earth, so the fire on the hearth radiated life within the house. It was the seat of the Lares and Penates, of the ancestors; a dwelling-place for the deceased; there also a stock of souls ready to enter into existence by new births was maintained. The Vedas taught that the hearth-fire was co-substantial with the cause of generation. Hence care was taken to preserve the purity of descent in the kin by preserving the flame of the hearth pure and unmingled with the fire taken from another house. The ancient Persians fed their fires, and especially their sacred fires, with only certain kinds of wood reputed to be cleaner than others, well dried and stripped of the bark. In all countries it was considered a fatal omen if the fire died out on the hearth. A new fire was to be lighted by the friction of two twigs, as to fetch some from a neighbor's would have been considered an adulterous union of hearths, an undue mingling of the blood of two families. The ancient naturalists supposed that the generation of fire by the friction of two woods, one of harder, the other of softer substance, was the exact counterpart of human generation. Life was compared to a flame, to a torch, and no comparison can be more true. A torch that was put out by throwing it violently on the ground symbolized in ecclesiastical rites excommunication, or the condemnation of a soul to eternal death. Sickness being identified with sin, fire became the first and most esteemed of curative agents. The mother, after delivery, walked through fires lighted on her right hand and on her left; the infants, especially the males, were fumigated with great care. Among some populations none could approach mother and child without stepping over a brazier. Fiery ordeals heralded the attainment of the age of puberty by both sexes. Purification by fire led to the institution of baptism by fire, which in many places was thought vastly superior to baptism by water; and the idea obtained its furthest development in the notion of purgatorial fires.

Not to dwell longer on the symbolic and superstitious uses of fire, we pass to a consideration of it in its relations to the destruction of it of life and property. History is full of accounts of its ravages in all parts of the civilized world. The following list embraces the more memorable of the great fires of which records have been preserved:

GREAT BRITAIN AND IRELAND.

- 798. London; nearly destroyed.
- 982. " greater part of the city burned.
- 1086. " all houses and churches from the east to the west gate burned.
- 1212. " greater part of the city burned.
- 1666. " "The great fire," Sept. 2 to 6. It began in a wooden house in Pudding lane, and burned for three days, consuming the buildings on 486 acres, 400 streets, lanes, etc., 13,200 houses, with St. Paul's church, 86 parish churches, 6 chapels, the guildhall, the royal exchange, the custom-house, many hospitals and libraries, 52 companies' halls, and a vast number of other stately edifices, together with 3 of the city gates, 4 stone bridges, and the prisons of Newgate, the Fleet, and the Poultry and Wood street compters. The fire swept from the Tower to the Temple church, and from the n.e. gate to Holborn bridge. Six persons were killed. The total loss of property was estimated at the time to be \$53,652,500.
- 1794. " 630 houses destroyed at Wapping. Loss above \$5,000,000.
- 1834. " houses of parliament burned.
- 1861. " Tooley street wharves, etc., burned. Loss estimated at \$10,000,000.
- 1873. " Alexandra palace destroyed.
- 1137. York; totally destroyed.
- 1184. Glastonbury; town and abbey burned.
- 1507. Norwich; nearly destroyed; 718 houses burned.
- 1612. Tiverton; 600 houses burned. Loss, \$1,000,000.
- 1700. Edinburgh; "the great fire."
- 1612. Cork; greater part burned, and again in 1622.
- 1613. Dorchester; nearly destroyed. Loss, \$1,000,000.
- 1614. Stratford-on-Avon; burned.
- 1760. Portsmouth; dock-yard burned. Loss, \$2,000,000.
- 1802. Liverpool; loss, \$5,000,000.
- 1875. Glasgow; loss, \$1,500,000.

FRANCE.

- 1118. Nantes; greater part of the city destroyed.
- 1137. Dijon; burned.
- 1524. Troyes; nearly destroyed.
- 1720. Rennes; on fire from Dec. 22 to 29; 850 houses burned.
- 1784. Brest; fire and explosion in dock-yard. Loss, \$5,000,000.
- 1871. Paris; communist devastations. Property destroyed, \$160,000,000.

CENTRAL AND SOUTHERN EUROPE.

- 64. Rome; burned during 8 days; 10 of the 14 wards of the city were destroyed.
- 1106. Venice; greater part of the city was burned.
- 1577. " fire at the arsenal; greater part of the city ruined by an explosion.
- 1405. Bern was destroyed.
- 1457. Dort; cathedral and large part of the town burned.
- 1491. Dresden was destroyed.
- 1764. Königsberg; public buildings, etc., burned. Loss, \$3,000,000.
- 1769. " almost destroyed.
- 1784. Rokitzan (Bohemia) was totally destroyed. Loss, \$1,500,000.
- 1801. Brody; 1500 houses destroyed.
- 1859. " 1000 houses destroyed.
- 1803. Posen; large part of older portion of city burned.
- 1818. Salzburg was partly destroyed.
- 1842. Hamburg; a fire raged for 100 hours, May 5 to 7. During the fire the city was in a state of anarchy. 4,219 buildings, including 2,000 dwellings, were destroyed. One fifth of the population was made homeless, and 100 persons lost their lives. The total loss amounted to \$35,000,000. After the fire, contributions from all Germany came in to help rebuild the city.
- 1861. Glarus (Switzerland); 500 houses burned.

NORTHERN EUROPE.

- 1702. Bergen; greater part of the town destroyed.
- 1728. Copenhagen; nearly destroyed; 1650 houses burned, 77 streets.
- 1794. " royal palace with contents burned.
- 1795. " 50 streets, 1563 houses.
- 1751. Stockholm; 1000 houses destroyed.
- 1759. " 250 houses burned. Loss, \$2,420,000.
- 1775. Abo; 200 houses and 15 mills burned.
- 1827. " 780 houses burned, with the university.
- 1790. Carlsrona; 1087 houses, churches, warehouses, etc., destroyed.
- 1858. Christiania; loss estimated at \$1,250,000.
- 1865. Carlstadt (Sweden); everything burned except the bishop's residence, hospital, and jail. Ten lives lost.

RUSSIA.

- 1736. St. Petersburg; 2,000 houses burned.
- 1862. " great fire. Loss, \$5,000,000.
- 1752. Moscow; 18,000 houses burned.
- 1812. " the Russians fired the city on Sept. 14, to drive out the army of Napoleon. The fire continued five days. Nine tenths of the city was destroyed. Number of houses burned, 30,800. Loss, \$150,000,000.
- 1753. Archangel; 900 houses burned.
- 1793. " 3,000 buildings and the cathedral burned.
- 1786. Tobolsk; nearly destroyed.
- 1848. Orel; large part of the town destroyed.
- 1850. Cracow; large part of the town burned.
- 1864. Novgorod; large amount of property destroyed.

TURKEY.

The following fires have occurred at Constantinople:

- 1729. A great fire destroyed 12,000 houses and 7,000 people.
- 1745. A fire lasted five days.
- 1750. In Jan., 10,000 houses burned; in April, property was destroyed estimated from \$5,000,000 to \$15,000,000. Later in the year, 10,000 houses were destroyed.
- 1751. 4,000 houses were burned.
- 1756. 15,000 houses and 100 people destroyed. During the years 1761, 1765, and 1767, great havoc was made by fire.
- 1769. July 17. A fire raged for twelve hours, extending nearly 1 m. in length. Many of the palaces, some small mosques, and nearly 650 houses were destroyed.
- 1771. A fire lasting 15 hours consumed 2,500 houses and shops.
- 1778. 2,000 houses were burned.

- 1782 Aug. 12. A fire burned three days: 10,000 houses, 50 mosques, and 100 corn-mills destroyed; 100 lives lost. In Feb., 600 houses burned; in June, 7,000 more.
1784. Aug. 5. A fire burned for 26 hours, and destroyed 10,000 houses, most of which had been rebuilt since 1782. In the same year, Mar. 13, a fire in the suburb of Pera destroyed two thirds of that quarter. Loss estimated at 2,000,000 florins.
1791. Between March and July, 32,000 houses are said to have been burned, and as many in 1795.
1799. In the suburb of Pera 13,000 houses were burned, and many magnificent buildings.
1816. Aug. 16. 12,000 houses and 3,000 shops in the finest quarter were destroyed.
1818. Aug. 13. A fire destroyed several thousand houses.
1826. A fire destroyed 6,000 houses.
1848. 500 houses and 2,000 shops destroyed. Loss estimated at \$15,000,000.
1865. A great fire destroyed 2,800 houses, public buildings, etc. Over 22,000 persons were left homeless.
1870. June 5. The suburb of Pera, occupied by the foreign population and native Christians, was swept by a fire which destroyed over 7,000 buildings, many of them among the best in the city, including the residences of the foreign legations. Loss estimated at nearly \$25,000,000.
1797. Scutari; the town of 3,000 houses totally destroyed.
1763. Smyrna; 2,600 houses consumed. Loss, \$1,000,000.
1772. " 3,000 dwellings burned; 3,000 to 4,000 shops, etc., consumed. Loss, \$20,000,000.
1796. " 4,000 shops, mosques, magazines, etc., burned.
1841. " 12,000 houses were burned.

INDIA.

1631. Rajmahal; palace and great part of the town burned.
1799. Manilla; vast store-houses were burned.
1833. " 10,000 huts were burned, Mar. 26; 30,000 people rendered homeless and 50 lives lost.
1803. Madras; more than 1000 houses burned.
1803. Bombay; loss by fire of \$3,000,000.

CHINA AND JAPAN.

1822. Canton was nearly destroyed by fire.
1866. Yokohama; two thirds of the native town and one sixth of the foreign settlement destroyed.
1872. Yeddo; a fire occurred in April during a gale of wind, destroying buildings covering a space of 6 sq. m.; 20,000 persons were made homeless.
1873. Yeddo; a fire destroyed 10,000 houses.

UNITED STATES.

1679. Boston; all the warehouses, 80 dwellings, and the vessels in the dock yards were consumed. Loss, \$1,000,000.
1760. " a fire caused a loss estimated at \$500,000.
1872. " great fire, Nov. 9 and 10. By this fire the richest quarter of Boston was destroyed. The fire commenced at the corner of Summer and Kingston streets. The area burned over was 65 acres; 776 buildings, comprising the largest granite and brick warehouses of the city, filled with merchandise, were burned. The loss was about \$75,000,000. Before the end of the year 1876, the burned district had been rebuilt more substantially than before.
1778. Charleston; a fire caused the loss of \$500,000.
1838. " one half of the city was burned, April 27; 1158 buildings destroyed. Loss, \$3,000,000.
1820. Savannah; 463 buildings were burned. Loss, \$4,000,000.
1776. New York; Sept. 21 (six days after the British took possession of the city), all the w. side, from Broadway to the North river, was burned.
1811. " about 100 houses burned on Chatham street.
1835. " the great fire of New York began in Merchant street, Dec. 16, and burned 530 buildings in the business part of the city; 1000 mercantile firms lost their places of business. The area burned over was 52 acres. The loss was \$15,000,000.
1845. " a fire in the business part of the city, July 20, destroyed 300 buildings. The loss was \$7,500,000. 35 persons were killed.
1845. Pittsburg; a large part of the city burned, April 11; 20 squares, 1100 buildings destroyed. Loss, \$10,000,000.

1877. Pittsburg; riot of railway workmen. Loss over \$3,260,000. These claims were compromised at \$1,600,000. Of railroad rolling stock there were wholly destroyed and partially damaged 107 locomotives. There were wholly destroyed 33 passenger coaches, 5 Pullman palace coaches, 3 officers' coaches, 7 emigrant coaches, 3 combined baggage and passenger coaches, 1 paymaster's car, 8 baggage cars, 10 express cars, 2 postal cars, 951 box or house cars, 92 refrigerator cars, 34 stock cars, 856 gondola or flat cars, 48 cabin or freight conductors' cars, 1 tool car, 98 coal and coke cars.
1846. Nantucket was almost destroyed.
1848. Albany; 600 houses burned, Aug. 17. Area burned over, 37 acres, one third of the city. Loss, \$3,000,000.
1849. St. Louis; 23 steamboats at the wharves, and the whole or part of 15 blocks of the city burned, May 17. Loss, \$3,000,000.
1851. " more than three quarters of the city was burned, May 4; 2,500 buildings. Loss, \$11,000,000.
1851. " 500 buildings burned. Loss, \$3,000,000.
1850. Philadelphia; 400 buildings burned, July 9; 30 lives lost. Loss, \$1,000,000.
1851. San Francisco; on May 4 and 5, a fire destroyed 2,500 buildings. A number of lives lost. More than three fourths of the city destroyed. Loss upwards of \$10,000,000. In June another fire burned 500 buildings. Loss estimated at \$3,000,000.
1866. Chicago; two fires, on Aug. 10 and Nov. 18. Loss, \$500,000 each.
1871. " the greatest fire of modern times. It began on the night of the 8th of Oct., and raged until the 10th. The area burned over was 2,124 acres, or $3\frac{1}{2}$ sq. m., of the heart of the city; 250 lives were lost, 98,500 persons were made homeless, and 17,430 buildings were consumed. The buildings were one third in number and one half in value of the buildings of the city. Before the end of 1875, the whole burned district had been rebuilt. The loss was estimated at \$195,000,000.
1862. Troy (N. Y.) was nearly destroyed by fire.
1866. Portland; great fire on July 4. One half of the city was burned; 200 acres were ravaged; 50 buildings were blown up to stop the progress of the fire. Loss, \$10,000,000 to \$11,250,000.
1871. October; large forest fires in Wisconsin and Michigan; 15,000 persons were made homeless; 1000 lives lost. Loss estimated at \$3,000,000.

BRITISH NORTH AMERICA.

1815. Quebec was injured to the extent of \$1,300,000.
1845. " 1650 houses were burned, May 28. One third of the population made homeless. Loss from \$2,000,000 to \$3,750,000. Another fire, on June 28, consumed 1300 dwellings; 6,000 persons were made homeless; 30 streets destroyed. Insurance losses, \$303,850.
1866. " 2,500 houses and 17 churches in French quarter burned.
1825. New Brunswick; a tract of 4,000,000 acres, more than 100 m. in length, was burned over; it included many towns; 160 persons killed, and 875 head of cattle; 590 buildings burned. Loss about \$300,000. Towns of Newcastle, Chatham, and Douglastown destroyed.
1837. St. John (New Brunswick); 115 houses burned, Jan. 13, and nearly all the business part of the city. Loss, \$5,000,000.
1877. " great fire on June 21. The area burned over was 200 acres; 37 streets and squares totally or in part destroyed; 10 m. of streets; 1650 dwellings; 18 lives lost. Total loss, \$12,500,000. Two fifths of the city destroyed.
1846. St. John's (Newfoundland); nearly destroyed, June 9. Two whole streets burned, upwards of 1 m. long. Loss estimated at \$5,000,000.
1850. Montreal; a fire destroyed the finest part of the city on June 7; 200 houses were burned.
1852. " a fire, July 9, rendered 10,000 people destitute. The space burned was one mile in length by half a mile in width, including 1200 houses. Loss, \$5,000,000.

SOUTH AMERICA.

1536. Cuzco was nearly consumed.
1861. Mendoza; a great fire followed an earthquake which had destroyed 10,000 people.
1862. Valparaiso was devastated by fire.
1863. Santiago; fire in the Jesuit church; 2,000 persons, mostly women and children, perished.

WEST INDIES.

1752. Pierre (Martinique) had 700 houses burned.
1782. Kingston (Jamaica) had 80 houses burned. Loss, \$2,500,000.

1795. Montego Bay (Jamaica); loss, \$2,000,000.
 1805. St. Thomas; 900 warehouses consumed. Loss, \$30,000,000.
 1808. Spanish Town (Trinidad) was totally destroyed. Loss estimated at \$7,500,000.
 1828. Havana lost 350 houses; 2,000 persons reduced to poverty.
 1843. Port Republican (Hayti); nearly one third of the town was burned.

The causes of the conflagrations above recorded, and the reasons why many of them were so extensive, are not far to seek. Wooden buildings crowded together upon narrow streets and filled with combustible materials, radical faults of construction, an insufficient supply of water, the lack of proper engines and other appliances, and the want of organization, are sufficient to account for such calamities. When, however, a conflagration has passed certain limits, there appear to be no agencies of human forethought or application which can control it. The Chicago fire, driven by a gale which was almost a hurricane, raged for a day through wide streets, consuming buildings of the best material, erected with the greatest care, in the most substantial manner. The wind carried great masses of burning brands skirmishing far in advance of the grand army of destruction, and constantly starting new fires, which the combined fire-brigades of the chief cities of the land could not have prevented or extinguished. It should be remembered, moreover, that these and other similar tables record only a small proportion of the losses by fire. The great conflagrations make a strong impression upon the public, while no record whatever is made of the vast number of smaller fires which in the aggregate are still more destructive. The value of the insured property destroyed annually by fire in the whole world has been estimated at from one hundred and twenty to two hundred millions of dollars. If we add to this the losses from the destruction of property uninsured, the figures will be startling indeed. The property slowly accumulated by the labor of thousands and tens of thousands of men may, for want of care, perish in a night, and the loss to the community would in no way be alleviated if the whole were insured. The question how fires may be most effectually prevented, and, when they occur, how they may be most surely and rapidly extinguished, is of the highest importance to mankind; and some light may be thrown upon the subject by considering the actual causes or occasions of fires, so far as they are known.

ANNUAL PROPERTY LOSSES IN THE UNITED STATES BY FIRES—1875-90.

| YEARS. | Aggregate Property Loss. | Aggregate Insurance Loss. | YEARS. | Aggregate Property Loss. | Aggregate Insurance Loss. |
|-----------|--------------------------|---------------------------|-----------------|--------------------------|---------------------------|
| 1875..... | \$78,102,285 | \$39,325,400 | 1884..... | \$110,008,611 | \$60,679,818 |
| 1876..... | 64,630,600 | 34,374,500 | 1885..... | 102,818,796 | 57,490,709 |
| 1877..... | 68,265,800 | 37,398,900 | 1886..... | 104,924,750 | 60,506,567 |
| 1878..... | 64,315,900 | 36,575,900 | 1887..... | 120,283,055 | 69,659,508 |
| 1879..... | 77,703,700 | 44,464,700 | 1888..... | 110,885,665 | 63,965,724 |
| 1880..... | 74,643,400 | 42,525,000 | 1889..... | 123,046,833 | 73,679,465 |
| 1881..... | 81,280,900 | 44,641,900 | 1890..... | 101,261,420 | 60,212,137 |
| 1882..... | 84,505,024 | 48,875,131 | | | |
| 1883..... | 100,149,228 | 54,808,664 | Total, 16 years | \$1,476,825,967 | \$829,126,020 |

The principal reported causes of fires, and the number of fires from each cause, in 1889, were as follows: Incendiarism, 1936; defective flues, 876; sparks (not locomotive), 411; matches, 574; explosions of lamps and lanterns, 502; stoves, 467; lightning, 276; spontaneous combustion, 279; forest and prairie fires, 270; lamp and lantern accidents, 254; locomotive sparks, 167; cigar stubs and tobacco pipes, 192; friction in machinery, 123; gas-jets, 241; engines and boilers, stationary, 123; furnaces, 85; firecrackers, 37; ashes and hot coals, 136. There were 7007 fires classified as "not reported," and 2101 as "unknown."

FIRE, ORDEAL BY. See ORDEAL.

FIRE, ST. ANTHONY'S. See ERYSIPELAS.

FIRE-ALARM, AUTOMATIC, a mechanical and telegraphic apparatus, used for detecting fires and warning the fire department that fires exist.

The automatic fire-detector is any instrument which will close an electric circuit when the surrounding temperature reaches a certain point, thereby setting in operation the ordinary fire-alarm telegraph apparatus with which it is connected. Such instruments are called thermostats. One form consists of a thermometer which has a platinum wire sealed into its bulb, and a second wire inserted at the mark of a certain temperature on the scale. The wires are in a telegraphic circuit, which remains broken until the increasing temperature causes the mercury to rise in its tube, and complete the connection by contact with the second wire. A signal is instantly communicated to the central station, showing the danger and the precise building at which it exists; an indicator, usually placed near the door, further shows from which apartment the signal was made, directing the fireman to the precise place where his services are in demand. The thermometer is usually placed in the ceiling. Insurance companies make reduced rates upon

buildings provided with this instrument. Other devices have employed the ignition of powder, the expansion of metallic rods, or the breaking of wires, but none are so delicate or so worthy of reliance as that described.

FIRE-ALARM TELEGRAPH, a network of wires running from a main office to all parts of a district and provided with signal-boxes conveniently placed and accessible, from which signals may be sent to the fire department by any one without special knowledge of the instruments, simply by turning a crank or pulling a hook, etc. Each signal-box contains a transmitter, consisting of a metallic wheel, provided with suitably arranged teeth; the spaces between the teeth are filled with some non-conducting substance, as ivory; a contact spring rests against the wheel, and as the wheel is turned, touches in succession the projecting teeth, closing the circuit at each tooth, and causing a signal at the central office, or, in small towns where there is no central office, at all the engine-houses to which the wire is run. If the arrangement on the wheel should be two teeth, a space, three teeth, a space, and two teeth, followed by a long space, one rotation of the wheel would give two signals, then three, then two, or the number 232, and this number will be repeated as often as the wheel is rotated. The wheel may be turned by a crank, or by a spring, acting so long as a detent is held away. The signal is received upon the common Morse instrument, and recorded on a strip of paper.

Usually, in large places the wheel is also arranged to give further signals, used to indicate that the fire is small and that only the first assignment of engines is required, or that it is large and that the first and second assignments are required. There is also often provided an inner box, to which the firemen only have keys, which contains telegraph instruments, which may be used to communicate with headquarters, giving all information and calling for such extra and special supplies as are needed. The outer or fire-alarm boxes are generally to be opened by keys entrusted to citizens, the nearest resident, the police, etc., but automatic doors for alarm boxes are coming into use. These may be opened without a key by simply twisting the door handle, the turning of which rings a very loud gong in the box and consumes some seconds of time, so that the giving of a malicious fire-alarm without detection is made difficult.

In places having a central office in connection with the fire-alarm system, the alarm signals are all received here and then repeated to the engine-house either by hand or by automatic machinery under the control of the central operator. The signals to the engines are in some systems sent to all the engines, and the fire attended by those that are nearest and assigned to that district. In other systems the signals are only sent by the central operator to such engines as should go to the fire. The teleseme (q.v.) is used as a fire-alarm box. See Prescott's *Electricity and the Electric Telegraph*.

FIRE ANNIHILATOR. See FIRE EXTINGUISHER.

FIRE ARMOR, an appliance to facilitate escape from a burning building, or to enable a person to remain in it in safety while extinguishing a fire, and resembling in principle the submarine armor now in common use. Fire armors were used fully half a century ago, but were not, as now, practically effective. Crofut's invention of 1873-74 consists of a shell of thin steel, covered with India rubber, forming a mask and provided with a porous curtain having a moist sponge to cover the mouth and nostrils. The curtain is drawn by a string closely around the neck of the wearer. The armor is very light and many experiments have proved its efficacy.

FIRE-ARMS may be defined as vessels—of whatever form—used in the propulsion of shot, shell, or bullets, to a greater or less distance, by the action of gunpowder exploded within them. They have played so great a part in the world's story, that their invention, development, and science deserve careful analysis. At a more advanced period, an obvious division of the subject into cannon, mortars, and small-arms presents itself; but in the infancy of the invention, and amid the obscurity enshrouding it, we can only seek to inquire into the origin of fire-arms generally.

The invention of gunpowder bears so directly upon the gradual introduction of fire-arms, that it will be well to consider the two discoveries concurrently. The widely prevalent notion that gunpowder was the *invention* of friar Bacon, and that cannon were first used by Edward III. of England, must be at once discarded. It is certain that gunpowder differed in no conspicuous degree from the *Greek fire* of the Byzantine emperors, nor from the *terrestrial thunder* of China and India, where it had been known for many centuries before the chivalry of Europe began to fall beneath its leveling power.

"Niter," says sir George Staunton, "is the natural and daily produce of China and India; and there, accordingly, the knowledge of gunpowder seems to be coeval with that of the most distant historic events." The earlier Arab historians call saltpeter "Chinese snow" and "Chinese salt;" and the most ancient records of China itself show that, when they were written, fire-works were well known several hundred years before the Christian era. From these and other circumstances, it is indubitable that gunpowder was used by the Chinese as an explosive compound in prehistoric times; when they first discovered or applied its power as a propellant, is less easily determined. There is an account of a bamboo tube being used, from which the "impetuous dart" was hurled a distance of 100 ft.; this was at a very early period, but it is difficult to say precisely when. It is recorded, however, that in 618 B.C., during the Taing-off dynasty, a cannon was employed, bearing the inscription: "I hurl death to the traitor, and extermination

to the rebel." This must almost necessarily have been of metal. We have also curious evidence in regard to the armament of the great wall; for capt. Parish, who accompanied lord Macartney's mission, reported that "the soles of the embrasures were pierced with small holes, similar to those used in Europe for the reception of the swivels of wall-pieces. The holes appear to be part of the original construction of the wall, and it seems difficult to assign to them any other purpose than that of resistance to the recoil of fire-arms." If this surmise be correct, the use of jingalls would be carried back to three centuries at least before the Christian era. Stone mortars, throwing missiles of 12 lbs. to a distance of 300 paces, are particularly mentioned as having been employed in 757 A.D. by Thang's army; and in 1232 A.D., it is incontestable that the Chinese besieged in Caifong-fou used cannon against their Mongol enemies. Thus, the Chinese must be allowed to have established their claim to an early practical knowledge of gunpowder and its effects.

It seems likely, however, that the principles of fire-arms reached Europe from India rather than China, and that country has equal, if not superior, claims to the first acquaintance with the art. The ancient Sanscrit writings appear to point very plainly to the operation of some primitive sort of cannon, when, in recording the wars of the Egyptian Hercules in India, it is stated that the sages remained unconcerned spectators of the attack on their stronghold, till an assault was attempted, when they repulsed it with whirlwinds and thunders, hurling destruction on the invaders; and a Greek historian of Alexander's campaign testifies that the Hindus had the means of discharging flames and missiles on their enemies from a distance.

These Indian philosophers seem, from the writings of Ctesias and Ælian, to have also possessed an unquenchable fire similar to that employed later by the Greeks. Passing from these very early times, in which there is reason to believe that some sort of great gun was employed, we come to the comparatively recent date, 1200 A.D., when their use is established beyond a doubt, for Chaséd, the Hindu bard, writes (in stanza 257) that the culivers and cannons made a loud report when they were fired off, and that the noise of the ball was heard at the distance of about ten coss, which is more than three-quarters of a mile. In 1258, the vizir of the king of Delhi went forth to meet the ambassador of Hulaku, the grandson of Genghis Khan, with 3000 carriages of fire-works (in the sense of weapons, probably a sort of rude musket). In 1368, 300 gun-carriages were captured by Muhammed Shah Bahmiani. The use of cannon had so far advanced in India by 1482, that they were even used for naval purposes; shells having been employed two years earlier by the sovereign of Guzerat. In 1500, the Portuguese had matchlockmen to contend with, as well as heavy ordnance. Pigafetta, in 1511, found the town of Borneo defended by 62 pieces of cannon mounted on the walls. So much for the antiquity and apparently common use of fire-arms in China and India, at times long antecedent to any knowledge of them in Europe, and during the period at which they were scarcely developed in an effectual degree. Most of the pieces discovered in India, and supposed to be of early manufacture, are composed of parallel iron bars welded together, and very often they had a movable breech-piece.

The knowledge of gunpowder and fire-arms may be presumed to have extended in a westerly direction through the Arabs, whom we find using them possibly in 711 A.D., under the name of *manjaniks*, and certainly very early in the 14th century. The Byzantine emperor, Leo, introduced "fire-tubes" between 890 and 911, for use in connection with Greek fire; and there can be little doubt that these were a species of cannon, probably of small bore. In Spain, both Moors and Christians used artillery as early as the 12th century.

Friar Bacon was conspicuous among his contemporaries for his general learning, and we have no evidence to show whether he discovered the ingredients of gunpowder independently of foreign aid, or whether he derived the knowledge from some ancient MSS.; the latter, however, seems the more likely conclusion, as sir F. Palgrave brought to light in the Bodleian library a letter from a Spanish friar, brother Ferrarius, who was a contemporary of Bacon, in which the materials of Greek fire are detailed, differing only in proportions, and in these but slightly, from real gunpowder. That the latter was identified of old with Greek fire, is shown by the name "Crake," applied to the first cannon used. This word, which still survives in "cracker," is pointed out by sir F. Palgrave to be nothing more than a Norman corruption of "Grec." Bacon's announcement dates from 1216; but the powder of his time, as made in the west, was not readily explosive, since the materials were but roughly cleared of impurities, and then mixed together on a slab, and probably little use could be made of it as a propellant until the process of granulating had been introduced by Bertholdus Schwartz in 1320. Immediately after this discovery, cannon of small size appeared in the armory of almost every state, as if their use had been known previously, although no practical effect had been given to the knowledge, on account of the badness of the powder manufactured. These cannon generally consisted of a smaller barrel or chamber to receive the charge, which fitted into a larger one containing the projectile. It may be safely assumed that these weapons, if terrifying from their noise, were tolerably harmless—at least to the enemy—in their practice. In 1326, the Florentine republic ordered the making of iron shot and cannon for the defense of its villages. In 1327, Edward III. used "crakeys of war" against the Scotch; in 1339, 10 cannons were employed in the

siege of Cambray. By 1346, various improvements had been made; and we find in the same year the consuls of Bruges witnessing experiments by one Peter, a tinman, who had constructed a cannon with a square bore, to throw a cubical shot of about 11 lbs.; his bolt passed both walls of the town, and unfortunately killed a man on the other side. We have the authority of Villani for believing that Edward III. had three cannon at Crécy; but the cannon then made were, from the little knowledge of casting, limited to about the size of modern duck-guns, and, as has been remarked, three very inferior muskets could have had but little to do with putting 50,000 men to flight.

Up to this time European ordnance had been kept back by the rarity and high prices of sulphur, saltpeter, and iron, the last having been so scarce in England, that it was thought necessary to forbid its exportation by a statute of 28 Edw. III. Still, crude as was their form, and small their number, fire-arms had established a firm footing in Christendom; their mission of civilization, and, paradoxical as it may appear, of humanity, had begun. With the first killing discharge, the doom of feudalism had gone forth. Plated armor no longer availed against the weapon of the peasant; and the mailed chivalry, the sinews of previous battles, who had trampled with their iron heels upon popular rights, no longer could carry all before them, but, like other soldiers, were now as loath to be slain by unseemly foes as the veriest villain in the host. The people discovered their powers of contending with the noblesse; by degrees, they rose for liberty, and suppressed the tyrannies of the petty lords who had long held them as mere bondsmen. In war, again, as artillery became more general, so the slaughter of battles diminished, for an army outmaneuvered was an army at the enemy's mercy, and therefore beaten; whereas, previously, in the hand-to-hand fights where victors and vanquished mixed pell-mell in single combat, a victory could only be really won when there were no foes left to slay. A battle as great as that at Crécy might now be gained with a loss to the vanquished of not more than 1000 men, instead of the 30,000 who are said to have fallen victims to the English sword or bow.

Dating from the reign of Edward III., the employment of cannon and bombards in siege operations became more or less general. Froissart records that the black prince took bombards, cannon, and Greek fire to the reduction of the castle of Romozantin in 1356, but it does not appear that he availed himself of fire-arms at the battle of Poitiers in the same year. The bombards seem to have been short, capacious vessels, from which stone balls were shot with small charges to a short distance, and at considerable elevation; they were essentially the parents of the present bombs or mortars. The cannon (*canna*, a reed), on the other hand, were, for some time at least, of extremely small bore, scarcely larger than muskets of the 18th c.; they discharged leaden bullets, and would have probably been used as hand-weapons, but for their cumbrous and heavy workmanship, which necessitated small carriages. Arms of this description are doubtless those referred to as having been brought by Richard II. to the siege of St. Malo, to the number of 400 pieces, where they are said to have kept up an incessant fire day and night on the town *without success*.

In the 15th c., armies for siege operations were usually accompanied by great and small guns, the latter being intended to keep down the fire of the besieged while the large bombards were being loaded, an operation requiring no small time. These guns were gradually improved, but it was not until the reign of Henry VIII. that the founders succeeded in casting iron ordnance, to the entire exclusion, until quite the present day, of cannon formed of square or rounded bars welded together. England had even then become famous for the workmanship of its ordnance. A gun found in the wreck of the *Mary Rose*, which sunk at Spithead in the above king's reign, shows that a degree of excellence had been attained in the manufacture of artillery, little inferior to that which has lasted till our own day, when rifled ordnance are rapidly superseding cannon of smooth bores. Still, so late as Henry's reign, although great guns were found very serviceable in siege and naval operations, where the defenses of those days offered but a trifling resistance to their power, they appear to have been looked upon rather as an incumbrance than an advantage with armies in the field. This is attributed partly to the heavy character of the guns themselves, and especially of their carriages, but more particularly to the badness, or rather absence, of the necessary roads for their transport. In 1552, it is recorded in the state papers that the "kinges ordonauns [were] unable to pass over Stanes More towards Carlile."

As time passed on, the details of the manufacture were improved, the general principles remaining the same; the size of the guns increased, while the proportionate weight of the carriages diminished; limbers (q.v.) were added, and the equipage of a gun gradually perfected and lightened. With increased caliber, to which augmented range was usually added, the number of cannon—at one period enormous—taken with an army was by degrees reduced, until now a certain standard proportion between artillery and infantry is ordinarily maintained. Three guns to a thousand infantry is the proportion now considered best. Of course, this proportion differs with the opinions of various commanders; but the greatest modern generals have always acted on the maxim, that it is wasteful to send a soldier on any duty of danger which a ball can be made to perform. As a weapon of offense, Vauban doubled the utility of heavy ordnance when he applied the ricochet (q.v.) system of firing. Napoleon may almost be said to have won his battles by artillery, for he rarely, if ever, brought his infantry into action except as supports, until a way had been opened for them, or a panic caused.

by the massed fire of large batteries of guns. The duke of Wellington also devoted the greatest attention to his ordnance train; while, referring to recent events, the campaigns of lord Clyde in India were remarkable instances of the use of artillery being pushed with abundant success to its greatest limit. During the Franco-German war of 1870-71, the Prussians were considered somewhat behind the age in their use of artillery.

Cannon of widely varying bores have at different times been cast, and the various sorts became so numerous in continental armies, as at one time to cause much inconvenience from the large quantities of ammunition which it was necessary to carry. Gustavus Adolphus set the example of reducing his guns to a few standard calibers, and the same improvement was immediately adopted systematically in the French and other armies. The introduction of rifled guns of late years has limited the classes in use in the British army to the following: *Muzzle-loaders*—17-in., 100 tons; 16-in., 80 tons; 12.5-in., 38 tons; 13.5-in., 23 tons; 12-in., 25 tons ("Woolwich infants"); 11-in., 25 tons; 10-in., 18 tons; 9-in., 12 tons; 8-in., 9 tons; 7-in., 7 tons, 6½ tons, and 90 cwt.; 80-pounder of 5 tons; 64-pounder; 40-pounder; 25-pounder; 16-pounder; 9-pounder; 7-pounder (steel) mountain-gun. *Breech-loaders*—7-in., 64-pounder, 40-pounder, 20-pounder, 12-pounder, 9-pounder, 6-pounder.

The mortar differs from all other guns in its solidity of form, its shortness, and its large bore. The object is the projection of shells by a more or less vertical fire, with the intention of breaking through and destroying, by weight and explosion together, roofs of magazines, public buildings, and so on, or of sinking a shell deep into earth-works of a fortress, in which it shall explode as a most deadly mine. The different sorts of mortar will be described under MORTAR. The mortar arose naturally out of the old bombard, and doubtless deviated by degrees more and more from the cannon. In very early days, we read in Arabian authors of a cylinder hewn in the rock at Alexandria, and used as a mortar. Such a cylinder, and of large size, is still to be seen at Gibraltar, where it was employed in the last siege against the Spanish, when it was made to discharge volleys of large stones, which spreading at times to a distance of 500 yards, constituted a formidable means of defense. In recent years, nearly all guns fire shells, so that the specific necessity for mortars has greatly diminished.

A gun is a frustum of a right cone, with a cylinder (bore) removed around the axis; from which it follows that the thickness of metal is greatest at the breech, where it has to withstand the effect of ignited powder in its most condensed, and therefore most powerful state. Guns are first cast in loam or dry sand, then turned to the required shape, and lastly bored with the minutest accuracy. Formerly, they were cast with the bore already formed; but the direction was rarely exactly correct, and the surface scarcely ever strictly even.

An article on fire-arms would be incomplete without some allusion to the progress made in small-arms. In the 15th c., the smallest sort of cannon were probably at times mounted and used as hand-guns. From this the step to the arquebus was rapid; that weapon developed as years passed into the clumsy matchlock; that into the firelock and flint-musket; then the percussion-musket; and lastly, into the beautiful rifles of our own day. For diminutives, small arquebuses were made to do duty as horse-pistols; genuine pistols succeeded them; these were gradually improved and reduced in size till they have culminated in the modern revolver, with its multiplied shooting power. For the various forms of fire-arms, their construction and use, see ARQUEBUS; ARTILLERY; BLUNDERBUS; BREECH-LOADING ARMS; CARBINE; CARRONADES; DAG; FIRELOCK; GUN; GUNNERY; LOCK; MACHINE GUNS; MORTAR; MUSKET; MUSKETOON; ORDNANCE; ORDNANCE FABRICATION; PISTOL; RAPID-FIRE GUNS; REVOLVER; RIFLED ARMS; and the names of their ammunition, as BULLET; EXPLOSIVES; EXPLOSIVES OF HIGH POWER; GUNPOWDER; PERCUSSION-CAP; SHELL; SHOT, etc. Also see *illus., GUNS*, vol. VII.

Many valuable works have been written on fire-arms from the days of Leonardo da Vinci and Tartaglia to the present. Among those consulted for this article have been *Études sur le Passé et l'Avenir de l'Artillerie* of the emperor Napoleon III.; *Our Engines of War*, by Capt. Jervis; Maj. Straith's *Treatise on Artillery*; Gen. Chesney *On Fire-arms*, etc.; J. H. Walsh, *Weapons of War* (1885); Greener, *The Gun* (1889).

FIRE-ARMS, PROVING (in law). In consequence of the frequency of accidents from the bursting of insufficient barrels, the English parliament has made it law that all barrels made or imported should be regularly proved in a public proof-house. A royal charter granted in 1637 to the London gunmakers, gave them powers to search for and prove and mark all manner of hand-guns, great and small daggs, and pistols. The several statutes of 1813, 1819, and 1855, rendering the proving of fire-arms compulsory, have been superseded by "the gun-barrel proof act, 1868" (31 and 32 Vict.), regulating the duties and powers of the proof-houses in London and Birmingham (the only two in England). By this statute the forging or counterfeiting of the proof-marks or stamps is treated as a misdemeanor punishable by imprisonment for not more than two years; and a fine of £20 is imposed on any person selling or exposing for sale barrels not duly proved, or exporting or importing barrels with forged proof-marks. These penalties are to be levied on conviction before two justices or a metropolitan or stipendiary magistrate. The statute does not extend to Scotland or to Ireland.

FIRE-BALLS are projectiles occasionally discharged from guns or mortars, for the purpose either of setting fire to, or of merely illuminating some work, against which hostile operations are directed. The usual ingredients are—mealed powder, 2; saltpeter $1\frac{1}{2}$; sulphur, 1; rosin, 1, turpentine, $2\frac{1}{2}$; with pitch, tow, naphtha, etc., as circumstances dictate. The use of fire-balls has, however, been in great measure superseded by the introduction of rockets (q.v.), and incendiary shells (q.v.). Akin to the fire-ball, was the *fire-arrow* of ancient warfare, which consisted of tow steeped in pitch, rosin, or some inflammable mixture, wrapped round the shaft, and fired alight among an enemy's works or troops. Greek fire was also discharged in many cases on large arrows surrounded by tow and shot from *balistæ*.

FIRE-BOTE, the right of a tenant for life or years, according to English law, to cut wood on the estate for the purpose of fuel. See **ESTOVER**.

FIRE-BRICK. See **BRICK**.

FIRE-CLAY is the variety of clay which is employed in the construction of gas-retorts, glass-pots, fire-bricks, crucibles, etc., which require to withstand high temperatures. It is found chiefly in the coal measures; and the more famous kind is the Stonebridge, which is found in a bed about 4 ft. thick. It also occurs largely near Glasgow, Newcastle-on-Tyne and in America and France. The principal constituents of fire-clay are silica and alumina, accompanied by small proportions of iron, lime, magnesia, water, and organic matter, as may be observed from the following table:

| | No. 1. | No. 2. | No. 3. | No. 4. | No. 5. |
|-------------------------------|--------|--------|--------|--------|--------|
| Silica..... | 64.10 | 51.10 | 48.55 | 69.25 | 83.29 |
| Alumina..... | 23.15 | 31.35 | 30.25 | 17.90 | 8.10 |
| Oxide of Iron..... | 1.85 | 4.63 | 4.06 | 2.97 | 1.88 |
| Lime..... | ..... | 1.46 | 1.66 | 1.30 | ..... |
| Magnesia..... | 0.95 | 1.54 | 1.91 | ..... | 2.99 |
| Organic Matter and Water..... | 10.00 | 10.47 | 10.67 | 7.50 | 3.64 |

Fire-clay is found abundantly near and at the surface of the ground, and is readily reduced to powder by traveling wheels. When kneaded with water, and fashioned into vessels and other articles, it is dried, and is then generally subjected to a strong heat, which drives off the water and organic matter, causes the silica to unite more firmly with the alumina, etc., and leaves a more or less porous material, which can withstand very high temperatures. The Passau crucibles are merely dried, and are not fired like Hessian crucibles and other fire-clay wares. The larger the percentage of silica (sand) in the clay, the more refractory are the articles fashioned from it; and hence sand is often added to clay to increase its fusing-point and refractory powers; but a certain proportion of alumina, etc., is required to serve as a flux, to cement and hold together the particles of sand. The proportions of sand and clay are determined by the temperature to which the manufactured article is intended to be exposed; and the fire-clay of crucibles or bricks, which are serviceable at a comparatively low temperature, as in the lining of lime-kilns, would become soft, and yield in glass or porcelain furnaces.

FIRE-DAMP is the miners' term applied to light carburetted hydrogen or coal-gas when it issues from crevices in coal-mines. See **GAS**.

FIRE-EATING, a name usually given to a variety of feats performed by jugglers with flaming substances, melted lead, red-hot metal, etc. Evelyn, writing under date Oct. 8, 1672, thus describes fire-eating in his day: "I took leave of my lady Sunderland. She made me stay dinner at Leicester house, and afterwards sent for Richardson, the famous fire-eater. He devoured brimstone on glowing coals before us, chewing and swallowing them; he melted a beer-glass, and eat it quite up; then taking a live coal on his tongue, he put on it a raw oyster; the coal was blown on with bellows till it flamed and sparkled in his mouth, and so remained till the oyster gaped, and was quite broiled; then he melted pitch and wax with sulphur, which he drank down as it flamed; I saw it flaming in his mouth a good while; he also took up a thick piece of iron, such as laundresses use to put in their smoothing-boxes, when it was fiery hot, held it between his teeth, then in his hand, and threw it about like a stone; then he stood on a small pot, and bending his body, took a glowing iron with his mouth from between his feet, without touching the pot or ground with his hands; with divers other prodigious feats." About 1818, Signora Josephine Girardelli, who described herself as the "original Salamander," performed astonishing feats of this kind in London and other places in England. According to the accounts of her, "she commences her performances by passing plates of red-hot iron over her legs; she then stands with her feet naked on a plate of red-hot iron, and afterwards draws the same plate over her hair and across her tongue," etc. About the same time appeared in Paris, M. Chaubert, whose astonishing powers of resisting heat attracted the attention of the national institute. Among other things performed by this person, was his going into a common baker's oven, with a leg of mutton in his hands, and remaining with the oven closed until the mutton was completely dressed. Another of his performances was standing in a flaming tar-barrel until the whole of it was consumed around him. He subsequently exhibited in London.

Many of the feats of this kind are undoubtedly mere tricks, or illusions, produced by sleight of hand; others are capable of scientific explanation. There is nothing more wonderful than stuffing blazing tow into the mouth—a common form of mountebank fire-eating—than in eating flaming plum-pudding, or in dipping the finger into spirits and letting it burn like a candle. It is also well known that the tongue, or the hand dipped in water, may be rubbed with impunity against a white-hot bar of iron; the layer of vapor developed between the hot metal and the skin prevents contact and produces coolness (see SPHEROIDAL CONDITION OF LIQUIDS). Such performances as those of M. Chabert are explained by the well-known power of the living body to maintain its normal temperature for a time, independently of the external temperature (see ANIMAL HEAT).

FIRE-ENGINE, a machine employed for throwing a jet of water for the purpose of extinguishing fires. This name was formerly applied to the steam-engine. Machines for the extinguishing of fires have been used from a very early date. They were employed by the Romans, and are referred to by Pliny; but he gives no account of their construction. Apollodorus, architect to the emperor Trajan, speaks of leathern bags, with pipes attached, from which water was projected by squeezing the bags. Hero of Alexandria, in his *Treatise on Pneumatics*—written probably about 150 years before the Christian era—proposition 27, describes a machine which he calls “the siphons used in conflagrations.” It consisted of two cylinders and pistons connected by a reciprocating cam, which raises and lowers the pistons alternately, and thus, with the aid of valves opening only towards the jet, projects the water from it, but not in a continuous stream, as the pressure ceases at each alternation of stroke.

Little or nothing is known as to the extent to which engines of this kind were practically used. We have accounts of “instruments for fires,” and “water syringes useful for fires,” in the building accounts of the city of Augsburg, 1518; and in 1657, Caspar Schott describes a fire-engine used in Nuremberg, which must have been almost identical in construction with that described by Hero. It had a water-cistern, was drawn by two horses, was worked by 28 men, and threw a jet of water, an inch in diameter, to a height of 80 feet. It was not until late in the 17th c. that the air-chamber and hose were added; the first being mentioned by Perrault in 1684, and the hose and suction-pipe being invented by Van der Heide in 1670. In England, hand-squirts were used up to the close of the 16th century. They were of brass, and contained 3 or 4 quarts of water. Two men held the handles at the sides, while a third forced up the piston. The nozzle was dipped in a vessel of water after each discharge, then raised, and the water again forced out. So clumsy an apparatus could have been but of little service in the fearful conflagrations to which our old wood-built towns were so subject.

With the addition of the air-chamber and hose, and some improvement in the details of construction, the “siphons” of Hero became the modern fire-engine. The mechanism consists of a cylindrical air-chamber; two cylinders with pistons, one of which ascends while the other descends; a pipe leading to each cylinder to supply it with water, and one leading from each to the air-chamber; and a pipe extending nearly to the bottom of the air-chamber which conveys the water to the hose.

The rising piston raises the water from the source of supply to fill its cylinder, and a valve prevents the backward flow of the water; the descending piston forces the water contained in its cylinder into the bottom of the air-chamber, where another valve is located, and thereby compresses the air. The pistons rise and descend alternately. The compressed air reacts by its elasticity, and pressing upon the surface, forces the water through the hose. In the space above the surface of the water, the whole of the air that formerly filled the chamber is supposed to be compressed. Assuming this to be one third of its original bulk, its pressure will be about 45 lbs. to the sq. in., and this pressure will be continuous and nearly steady, if the pumps act with sufficient force and rapidity to keep the water at that level. As air may be compressed to any extent—and its elasticity is increased in exactly the same proportion—the force that may be stored in the compressed air is only limited by the force put upon the pumps, and the strength of the apparatus.

Under proposition 9 of the same work, in which “the siphons used in conflagrations” are described, Hero describes and figures the air-chamber as “a hollow globe or other vessel, into which if any liquid be poured, it will be forced aloft spontaneously and with much violence, so as to empty the vessel, though such upward motion is contrary to nature. The globe is represented with a single piston attached for compressing the air. Thus, about 1800 years elapsed before proposition 9 and proposition 27 of this work were put together for so obvious and useful a purpose as the fire-engine, although the book was tolerably well known to the mathematicians of the period; and when they were put together, it was probably done by a practical man, who had never heard of the name of Hero.

The more recently constructed fire-engines include contrivances for preventing the entrance of mud and gravel, and for getting readily at the valves in case of their being out of order, while the cistern is dispensed with, a hose being carried directly to the water-supply. They are usually drawn by two or four horses, though smaller engines are made to be drawn by hand or by one horse. The hose is of leather, fastened

by metal rivets, instead of the sewing formerly used. In the United States, cotton is woven into a tube by machinery constructed for the purpose. Two such tubes are fitted one within the other, and held together by a solution of India-rubber, which, on consolidation, forms a water-tight layer. A fire-engine with two pumps, and worked by levers or brakes, was invented in Egypt in the 2d c. B.C. For centuries the chief device for extinguishing fires was the hand syringe or "s squirt." In England its use was continued for a long time, leathern buckets, ladders, and crooks taking its place; but was revived near the close of the 16th century. Specimens of the "hand-squirt" are still preserved in London as curiosities. It seems probable that a rude sort of engine was also used in London at a very early day. In Germany, huge syringes, mounted on wheels, were in use in 1618. Paris had fire-engines of some sort at the beginning of the 18th century. In England, in 1734, engines of various construction were manufactured, the most successful of which was that invented by Newsham. Two of his machines, the first invention of the kind ever used in this country, were introduced in New York in 1731. It was more than fifty years after this that the leather valves within the cylinders were superseded by metallic valves, placed in valve-chests apart from the cylinders and the air-chamber. Rotary and semi-rotary pumps were also introduced, and are still used to some extent in London. Floating fire-engines worked by hand were used on the Thames before the close of the 18th century. In some cases the mechanism that worked the pumps was used to move the paddle-wheels. It was not until 1850 that floating fire-engines worked by steam came into use in England. An engine of this sort has done good service for years on the North and East rivers around New York. The first steam fire-engine is believed to be that made by Braithwaite in London in 1829. Ericsson built one in New York, about 1840, similar to Braithwaite's; and Latta, in Cincinnati, produced, in 1850, the first machine which was practically useful. Cincinnati was the first city in the United States to organize a steam fire department, but other large cities and towns rapidly followed the example. The steam fire-engines now in use may be classified as having reciprocating pumps without fly-wheels, reciprocating pumps with fly-wheels, and as rotary engines. The Amoskeag company (Manchester, N. H.) builds a very effective engine, which by a simple addition is self-propelling; a pole may also be attached, that the machine may be drawn by horses. The fly-wheel shaft is provided with a pulley, from which a chain connection furnishes motive power to a larger pulley in the back driving-axle. The pulley on the fly-wheel shaft may be disconnected when the engine is pumping. On the road the engine is steered by a large wheel upon an upright shaft in front of the driver's seat; a pinion on the lower end of this shaft works in a horizontal gear-wheel, controls the front axle, and guides the machine. There is a differential gear by which one of the hind wheels may travel faster than the other when going round a curve. When standing in the engine-house, steam is maintained in a self-propelling engine, at about 80 lbs.; in steam-engines drawn by horses, at about 51 lbs.; this is done by attachment to a stationary boiler in the engine-house, fuel being laid in the furnace of the engine, to be ignited when leaving the house. See FIRE.

FIRE-ENGINE TESTS, INTERNATIONAL EXPOSITION, PHILADELPHIA, 1876.

| NAME. | WEIGHT IN LBS. | | DIAMETER. | | STROKE. | BOILER. | | | PRESSURE PER SQ. IN. | | DIAMETER NOZZLE. | STREAM. | |
|--------------------|----------------|-------------|------------|------------|---------|-----------|---------|----------|----------------------|--------|------------------|-----------|-------------|
| | Light. | With water. | Steam Cyl. | Water Cyl. | | Diameter. | Height. | Surface. | Steam. | Water. | | Vertical. | Horizontal. |
| | Lbs. | Lbs. | Inch. | Inch. | In. | Inch. | In. | Sq. ft. | Lbs. | Lbs. | Inch. | Feet. | Feet. |
| Silsby..... | 6,596 | 7,054 | 13.5 | 8.38 | ..... | 40. | 60 | 330 | 88. | 139.6 | 1.46 | 174.7 | 308.4 |
| Nichols..... | 7,122 | 7,323 | 9. | 6. | 7. | 40. | 60 | 251 | 109.7 | 82.1 | 1.47 | ..... | 202.9 |
| La France..... | 7,061 | 7,355 | ..... | ..... | ..... | 40. | 56 | 265 | 62.8 | 78.9 | 1.46 | ..... | 47.7 |
| Ronald..... | 5,812 | 6,022 | 7.75 | 4.33 | 9. | 32. | 56 | ..... | 67.7 | 64.1 | 1.32 | ..... | 27.2 |
| Clapp & Jones..... | 3,810 | 3,505 | 7. | 4.25 | 7. | 28. | 52 | 123 | 84.9 | 119. | 1.01 | ..... | 182.4 |
| ..... | 6,503 | 6,825 | 8. | 4.63 | 8. | 38. | 58 | 248 | 90.1 | 157.1 | 1.41 | 202.3 | 215.2 |
| Button..... | 5,035 | 5,325 | 12. | 8. | 4.5 | 34.5 | 60 | 190 | 65.6 | 83.2 | 1.24 | ..... | ..... |
| Amoskeag..... | 7,522 | 8,020 | 7.5 | 4.5 | 8. | 31.8 | 64 | 175 | ..... | ..... | ..... | ..... | ..... |
| ..... | 6,105 | 6,264 | 8.5 | 4.25 | 8. | 30.5 | 61 | 151 | ..... | ..... | ..... | ..... | ..... |
| Clapp & Jones..... | 3,925 | 4,098 | 8 | 4.5 | 8. | 32. | 52 | 147 | 100.7 | 145.5 | .96 | 192.3 | 160.4 |

It has been questioned whether, in cases of very intense combustion, a comparatively small stream of water has any subduing effect at all—some assert that it may even increase the conflagration. Various chemical liquids have been proposed as flame-extinguishers; but plain water is still the only power used to any extent.

In many continental towns, fire-watchmen are stationed in commanding situations, such as church-towers; and their duty is to ring a fire-bell, or otherwise give the alarm, immediately upon observing a conflagration. The fire-companies of the United States are usually paid; but in some places, men volunteer, receiving certain immunities from taxation and militia service. Their annual parade-day is quite a fête. Each company has a special uniform; and in some cities the rivalry among them is so great, that they frequently have desperate fights for the best "location" for their engines. Prizes are awarded to those whose engines throw a jet of water to the greatest height. An admira-

ble system of electro-telegraphy has been adopted, to give notice from station to station in the event of fire. Nevertheless, American conflagrations are often frightfully destructive: witness those at Chicago in 1871, and at Boston in 1872 and 1873.

In Constantinople, there are two fire-towers, one on each side of the golden horn, with watchmen continually stationed there. A large wicker-ball is hauled up to the side of the tower as a signal, and the cry of "There is a fire at Scutari, Tophané," or whatever be the quarter of the city in which it occurs, is raised and taken up by the patrol, who strike the pavement with their iron-bound staves as they repeat the cry. In a few minutes, the alarm is thus spread throughout the whole city. Interesting information regarding fires and fire-apparatus will be found in the following: Dana, *The Fire Department in the United States* (1858); Roper, *A Handbook of Modern Steam Fire-engines* (1877); and Shaw, *Fire Protection* (2d ed., 1889).

FIRE-ESCAPES. An immense number of contrivances have been at different times proposed for enabling people to escape by windows and house-tops from burning buildings. They are of two distinct kinds—one for affording aid from outside, and the other for enabling those within the house to effect their own escape. Of the latter, the simplest is a cord that should be firmly attached to the window-sill of every sleeping apartment, and coiled up either in a box on the floor, or under a dressing-table, or other suitable place. A rope one quarter or three eighths of an inch thick, and knotted at intervals of about a foot, is well adapted for the purpose. A good quarter-inch sash-cord will support from 3 to 4 cwt., or more if new, and will cost from 10c. to 50c., according to the height of the room. A man with tolerable nerve may let himself down by means of such a cord, either by placing his feet against the wall and bringing "hand over hand" down upon the knots, or by clinging with his feet and knees to the rope as well as with his hands. A man may let down a woman or child by means of a sack at the end of the rope, or simply by fastening them to the end, and letting the rope pass through his hands, aided if necessary by the friction of the window-sill, if it be allowed to bend over it. A rope coiled upon a drum inside a dressing-table, with a winch-handle to uncoil it, is another form. A pulley fixed to the window-sill, over which runs a rope with a chair or simple board to sit on, is a well-known contrivance.

Some means of escape from every sleeping-room should be provided, and the inmates should be thoroughly prepared by knowing beforehand how to act in case of a fire cutting off communication with the usual means of outlet. In a row of houses with projecting balconies, a board of sufficient length to reach from the balcony of one house to the next may be kept in each room, or even a rope might be thrown across with the aid of a stone or lump of coal, etc., tied to one end. An exit by the roof or from the window on to the parapet affords a ready means of escape from a top story, and should always be provided in tall houses. In case of emergency, when no provision has been made, the cord holding the sacking of the bedstead may be undone, or the bedclothes and curtains tied together to form a rope; or as a last resource, the bedding may be thrown out of window to form a cushion to alight upon in case of the cord or bedclothes being too short to reach the ground; or if there be no time to extemporize such cordage, and it should be necessary to drop directly from the window, in this case, it would be better to hang by the hands from the window-sill and then drop, than to jump direct, as the height of the fall would be somewhat diminished thereby. In all such cases, presence of mind and coolness is of the utmost importance, and may render very simple and slender means of escape more effectual than the most complete and elaborate would be without these qualities; and presence of mind may be to a great extent acquired chiefly by being mentally prepared, and, if possible, by rehearsals of what should be done in case of danger.

Fire-escapes to be used from without, consist either of simple ladders kept in churches, police offices, or other convenient stations, or a series of ladders that can be joined together; of poles with baskets attached; of ropes with weights at one end, that they may be thrown or shot into windows; of combinations of ladders, ropes, bags, baskets, nets, etc. The fire-escape now generally adopted by the society for the protection of life from fire, is a light carriage or frame-work on wheels, to which a series of ladders, etc., are attached. It is thus described by the society: "The main ladder reaches from 30 to 35 ft., and can instantly be applied to most second-floor windows by means of the carriage-lever." This projects on the opposite side to the ladder like the shafts of an ordinary carriage, and works upon the axle of the wheels as a fulcrum. "The upper ladder folds over the main ladder, and is raised into position by a rope attached to its lever-irons on either side of the main ladder; or, as recently adopted in one or two of the escapes, by an arrangement of pulleys in lieu of the lever-irons. The short ladder for first floors fits in under the carriage, and is of the greatest service. Under the whole length of the main ladder is a canvas trough or bagging made of stout sail-cloth protected by an outer trough of copper wire net, leaving sufficient room between for the yielding of the canvas in a person's descent. The addition of the copper wire is a great improvement, as, although not affording an entire protection against the canvas failing, it in most cases avails, and prevents the possibility of any one falling through.'

FIRE-EXTINGUISHER, or **FIRE-ANNIHILATOR,** is an apparatus for extinguishing fires by pouring upon them water surcharged with some substance of an anti-com-

bustible nature. The substance chiefly employed for this purpose is carbonic acid gas, the conveniences for generating which, for use at the moment it is wanted, are various. The ordinary fire-extinguisher is a cylindrical vessel, holding about eight gallons; it is made to be strapped to the back, and provided with a short hose and nozzle, through which a stream of considerable force may be discharged. The cylinder is filled with water, and within are two small vessels, one containing a bicarbonate, the other a strong acid. When the apparatus is to be used, the contents of these vessels are emptied into the water, and the carbonic acid, set free by chemical action, is taken up by the water. The pressure created by the confined gas forces out the liquid in a strong jet when the passage is opened. The gas, in coming in contact with the flames, assists in extinguishing it by excluding the atmospheric air. For subduing a fire in its first stages this contrivance is often very effective. The first apparatus of this kind ever brought into successful use was made in London in 1816. The contrivance for generating the gas was slightly different from that above described, although the principle was the same. Within the last 12 or 15 years various methods of charging the water in the cylinder have been devised. The Babcock extinguisher is filled with a solution of bicarbonate of soda, in which is suspended a vessel of acid, which is made to tilt over and discharge its contents into the solution when the stopper is withdrawn, thus freeing the carbonic acid. Use has also been made of salts in solution, which, as the water evaporates, are left incrusting the substances in combustion, thereby excluding the air, or, failing in this, giving off incombustible gases. Large cylinders filled with chemicals in the manner above described have been mounted on wheels, and, known as chemical fire-engines, have been used to some extent, but they are valuable only in the earliest stages of a fire. Various methods have been proposed for securing the automatic action of the fire-extinguisher through the increased temperature caused by fire, but they have not been very successful. An important adaptation of the fire-extinguisher has been applied to sea-going ships. A series of pipes on the upper deck communicate severally with various compartments of the hold, the coal-bunkers, the main deck, etc. The chemical agents are placed in a box, to which steam also may be admitted; when in action, the steam mingles with the carbonic acid and the two are conveyed to the place of danger, where they take the place of the air, smother, and finally extinguish the fire. The steam pipes are perforated along their sides that the distribution may be complete and positive. A system of distributing water, as in a planing mill or other factory, consists of an extended system of pipes placed near the ceiling of the different rooms and connected with a central supply, which may be a tank near the roof, or a pipe from a powerful engine. The distributing pipes are perforated with many small orifices, so small as to deliver the water in spray. If an alarm comes from a given room, the supply of water is turned to that room, which is instantly filled with spray.

FIRE-FLY, a name common to all winged luminous insects, at least to all that possess much luminosity. Except the lantern-fly (q. v.), they are all coleopterous, and belong to two nearly allied tribes, *lampyrides*, to which the glowworm (q. v.) also belongs, and *elaterides*, to which belong our skipjack beetles, and of which the larvæ are too well-known to farmers as wire-worms. The male glowworm, which alone is winged, has too little luminosity ever to receive the name of fire-fly, but the fire-flies of the s. of Europe (*lampyris italica*) and of Canada (*L. corusca*) are nearly allied to it. See GLOWWORM. Fire-flies are only seen in the most southern parts of Europe. They abound in almost all the warmer parts of the world, and the brilliancy of the spectacle presented by them when glancing about in numbers amidst the darkness of night, has been often described with enthusiastic admiration. Mr. Gosse says of the Canadian fire-fly: "The light is of a yellow color, very different from the blue gleam of the English glowworm: from this circumstance I at first took them for candles in the woods, and though told what they were, at every one that appeared, the same idea would come across my mind. . . . They more frequently give out the light while flying, than when crawling or resting, though we may often observe the intermittent gleam as one crawls up a stalk of grass, or rests on the leaf of a tree. They fly slowly, and as they fly, emit and conceal their light with great regularity at intervals of two or three seconds; making interrupted lines of light through the air, gleaming slowly along for about a yard, then suddenly quenched, and appearing again at the same distance ahead. The insect is a pretty beetle, with soft elytra, of a light-brown color, marked with red, and handsomely striped; the light proceeds from the last three segments of the abdomen, which are of a delicate cream color by day. At night these three segments are bright at all times; but at the regular intervals I have mentioned, they flash out with dazzling splendor. If this part be plucked off and crushed, many patches of brilliance occur for a few moments among the flesh, but they gradually die away." He further describes those fire-flies as appearing in great numbers in summer evenings, over wet and marshy ground, millions of them above a river, or over the surface of a large field, like stars on a clear winter night, but flashing and disappearing, and moving about in mazy evolutions.—But still more brilliant are the fire-flies of more tropical regions, belonging to the tribe *elaterides*, as the fire-fly of the West Indies (*elater noctilucus*), which gives out its light chiefly from two eye-like tubercles on the thorax. The light is so powerful, that the smallest print may be read by it; and this becomes quite easy if a few of the insects are inclosed in a small glass vessel. They are not

unfrequently employed—particularly in St. Domingo—to give light for household purposes; and they are used for purposes of decoration on festival-days by women, who attach them to their dress or to their hair. One which had been accidentally brought alive to Paris, once astonished and alarmed the Faubourg St. Antoine. These insects are caught in some parts of the West Indies—a torch being used to attract them—and brought into houses to destroy mosquitoes, which they eagerly pursue and devour. See

LUMINOSITY OF ORGANIC BEINGS.

FIRE INSURANCE. See **INSURANCE.**

FIRE ISLAND AND BEACH. Fire Island, or rather “the fire islands,” in the last century, consisted of three very small uninhabited islands in the Great South bay of Long island. They were but a few acres in extent, and at high tide were almost submerged. “Fire island” now means the low, sandy spit of land, about 30 m. in length, which separates the larger portion of Great South bay from the Atlantic ocean. At its western end is Fire Island inlet, near which there is a lighthouse of the first order. The beach near the w. end is a place of summer resort for considerable numbers of people. On this beach Margaret Fuller Ossoli, with her husband and child, perished by shipwreck, July 19, 1850.

FIRE LANDS. See **OHIO.**

FIRELESS ENGINE, a form of steam or vapor engine which is detached from the heating apparatus. Dr. Emile Lamm, of New Orleans, invented an engine in which the motive power was derived from the vapor of ammonia. The ammonia, as it escaped from the engine, was passed into a reservoir of water, in which it was absorbed; the water when heated to a temperature of about 135° F., gave up the ammonia as gas, which was returned to the engine to be used over again, and then again absorbed and returned as before. This engine was found efficient and economical for the movement of street cars. The use of ammonia was soon abandoned, steam taking its place. Water heated to 212° F. becomes vapor, if the pressure upon it be no more than the usual atmospheric 15 lbs. per sq. inch. If the pressure be greater, the water remains liquid until a higher temperature is reached, the temperature varying with the pressure according to well-known laws. If steam at a high pressure be admitted to water of low temperature and pressure in a closed vessel, the steam will be condensed in the water, but the pressure in the vessel will be increased, while the volume of the water will be enlarged by the volume of that derived from the condensed steam. The water thus becomes charged with steam condensed under high pressure, and when the pressure is relieved, a portion of the steam reverts to its condition of vapor, and may be conducted in the usual way to a cylinder and piston, where it will do its customary work. The opening of the valves gives vent to the vapor, gradually reduces the pressure, and relieves the condensed steam; so that a tank, filled with water and stored with many times its volume of uncondensed steam, will furnish motive power sufficient to move the engine and a considerable train of cars for a trip of several miles. On its return, the tank is connected with a stationary boiler from which it receives a fresh supply of steam. It will not be forgotten that the real force of the steam is due to the heat which it contains, and that if the heat be lost, by radiation or otherwise, from the tank containing the condensed steam, its potential energy is so much reduced.

In applying these principles, the mechanism is that of an ordinary locomotive minus its fire-box, having a water-tank instead of a boiler; the appliances for stopping, starting, and backing, are as usual. The tank may be about 6 ft. long, and 3 ft. in diameter, covered thickly with felt and wood to retain its heat. Steam is taken until the gauge indicates 135 to 150 lbs., the temperature for 135 lbs. being 353°. With this accumulation of power the machine will run 5 to 7 m. before the pressure is reduced to 60. lbs. The labor and care of firing is avoided on one of these engines.

FIRE LOCK, the name applied on its introduction, in 1690, to the old musket, which produced fire by the concussion of flint and steel, to distinguish it from the *matchlock* previously in use, which had been fired by the insertion of a lighted match at the powder-pan. Writers of the earliest part of the 18th c. called firelocks “asnaphans,” a word obviously corrupted from the Dutch *snaphaan*, and leading to the inference that they were brought to England by William III. and his Dutch auxiliaries. Their first invention is, however, involved in obscurity. The weapon was superseded before 1830 by the percussion musket; which, in its turn, has now yielded to the rifle. See **RIFLED ARMS.**

FIREMAN'S RESPIRATOR, invented by Dr. Tyndall. It is a combination of his own respirator of cotton wool moistened with glycerine, and Dr. Stenhouse's charcoal respirator. With this protection a man can remain a long time in the densest smoke.

FIRENZUOLA, ANGELO, an author distinguished for the Attic choiceness of his language, was b. at Florence in 1493. Having completed at Perugia the studies which he commenced in Florence, he proceeded to Rome in anticipation of a brilliant legal career, but shortly abandoned the eternal city, disappointed in hope and shattered in health. It seems well authenticated, that he finally enrolled himself among the monkish brotherhood of Vallombrosa, and rose to considerable influence, in spite of the extreme license of morals and licentiousness of writing for which he was noted. The date of his death

is doubtful, but it is generally placed between 1542 and 1544. His chief works are a spirited paraphrase of the *Golden Ass of Apuleius*—in which he is generally considered by his countrymen to have far excelled the original in nerve and beauty of language; *I Discorsi degli Animalì*—containing some sound lessons of just legislation to the ruling powers, the censure being skillfully veiled by means of his animal orators; *I Ragionamenti*, a work in close imitation of the *Decameron* both as regards the impurity of sentiment, and classic purity of language; *Il Trattato della bellezza delle donne*, an eulogistic discussion concerning the charms of the gentle sex, to whom he was inordinately devoted. His works were published in Florence after his death. The best edition is that of Florence (1763, 3 vols.).

FIRE-POLICY. See **INSURANCE**.

FIRE-PROOF BUILDINGS. The problem of constructing warehouses, dwelling-houses, etc., that shall be proof against all risk of conflagration, has not yet been solved. The liability to conflagration may be greatly diminished by the construction of a building, but cannot be entirely averted; and therefore, in all "fire-proof" buildings containing furniture or other combustible materials of any kind, the ordinary precautions against fire should be strictly observed. It is well to state this at the outset, as, unless it be understood, a so-called fire-proof building may be more dangerous than an ordinary one, especially in warehouses, etc., intrusted to the care of watchmen and others, who, relying upon the supposed immunity the name expresses, are liable to neglect many precautions they would not fail to observe in a building believed to be dangerous. The most destructive fire that has occurred in London since 1666 was that at Cotton's wharf, in 1861, the warehouses of which were what is called "fire-proof." The great fury of this conflagration depended on the nature of the goods that were stored. It is scarcely possible to believe that such combustibles as tallow, turpentine, etc., could have been stored in the vicinity of saltpeter, unless there had existed some faith in their practical isolation from each other by the fire-proof divisions of the building, as it is so well understood that saltpeter, though incombustible of itself, intensifies to an immense extent the combustibility of all combustibles, by supplying them with undiluted oxygen when heated in contact or within a moderate distance of them.

The nearest approximation to fire-proof construction may be obtained as follows: The walls should be of stone or brick, and any ties, lintels, etc., required in the construction should be of iron. The staircases should be of iron or stone, and the floors or landings of tiles, concrete, or stone. Wherever wood is inevitably used, it should be prepared with silicate of soda (see **FIRE-PROOFING**). Instead of wooden joists to support the floors of each story, arched stone or brick work should be used, and this should be put together with sufficient care to be independent of the mortar. The roof should be constructed in like manner, wooden rafters being entirely excluded. The doors should be of iron, and the security would be much increased if the doors between any two apartments containing combustible materials were double, with a space between them equal to the thickness of the walls. Of course, it is not practicable to carry out all these precautions in a dwelling-house, but the danger from fire may be considerably diminished by attending to some of them. Wooden staircases are especially dangerous. The most important conditions for a warehouse are, that each apartment shall be separated from the next by stout walls of non-conducting materials, and more especially, that each shall be as nearly as possible air-tight; and whenever, from the nature of the goods, ventilation is required, it should be obtained by periodically opening the doors and windows. If this latter condition is fulfilled, any fire would extinguish itself, unless there be along with the combustible goods some oxygen-giving substance, such as saltpeter, chlorate of potass, or other nitrates or chlorates.

At first sight, it may appear that a warehouse built entirely of iron would be effectually fire-proof, but this is far from being the case. In the first place, iron conducts heat more readily than any other material used in building; secondly, cast-iron is liable to crack and split when suddenly heated or cooled. Iron supports may, under some circumstances, be even more objectionable than wood, for if the water from a fire-engine were to play upon a heated cast-iron girder, it would probably give way immediately, while a stout wooden beam might be extinguished before being burned through. When buildings supported by iron girders are burning, they are far more dangerous to firemen than those with wood, as the experienced fireman can form a pretty accurate judgment of the time that burning wooden beams will stand, and may move about in their vicinity to direct the stream of water to where it is most needed, but iron girders split and fall without visible notice. It is on this account that floors of arched masonry are recommended above. In great fires, the heat is sufficient to fuse iron.

Without going to the expense of making warehouses and manufactories absolutely fire-proof, certain precautions not of a costly nature might be usefully adopted, for the purpose of merely checking the progress of conflagration until the arrival of fire-engines. Among these simple measures, may be included iron doors hinged on stone between different departments; a sufficient deafening not easily destructible between the ceiling of one story and the floor of that above; and stone stairs. For rendering timber difficult of combustion, see **FIRE-PROOFING**. See also **SAFES**, **FIRE-PROOF**.

From time to time a great many attempts have been made to construct buildings in such a manner and of such material as to make them indestructible by fire, but they have been only partially successful. It is easy to employ incombustible materials in the construction of walls, floors, stairways, doors, etc.; but it is not so easy to make them proof against disintegration from intense heat and the application of water. In the great Chicago and Boston conflagrations it was found that walls of granite, brick, and marble, which no fire could consume, crumbled into ruin under the combined influence of fire and water, and so were no barrier to the progress of the flames. The fire could hardly have made its way more rapidly or surely if all the buildings in its path had been of wood. Hard-burned bricks no doubt make the safest walls and partitions, while ceilings and floors of the same material laid in cement are as nearly indestructible by fire as anything that the ingenuity of man has invented. It was thought at first that iron buildings would be proof against fire; but the iron girders, beams, and posts, though they cannot be consumed, are so expanded and bent under the influence of heat as to be rendered useless for supports in time of a fire. No doubt a building may be so constructed that a fire in one of its rooms may destroy what is combustible therein, without going any further and without endangering the building itself; but if it is contiguous to other buildings in conflagration, its walls must be very hard and thick to resist the power of the flames, while they can hardly protect anything within that is combustible, for the fire will make its way through doors or windows, unless extraordinary precautions have been observed. Many brick walls fail to resist fire on account of defective mortar, which crumbles from heat, causing them to deflect and fall. Wood, well pugged with cement, is strongly recommended by many architects as preferable to iron for girders and beams, but unless the cement is of the best quality, it will afford little protection. In London, safety is sometimes sought in arrangements for flooding buildings with water through pipes constantly connected with a reservoir; but in many cases this would afford but slight protection. The system of pugging wood with cement for light structures is in common use in Paris. Oak timber, on account of its hardness, is chiefly used for this purpose. The framework, made in the ordinary way, is battened with oak inside and outside, the battens being only a few inches apart. The space between the two series of vertical battens is filled with burnt clay, chips of stone, or broken brick, and then the surface on each side is coated with plaster of Paris, completely filling the interstices, covering the wood, and making a hard, smooth wall, impervious to fire to a certain extent, but liable to crack and fall away under the influence of great and protracted heat. The ceilings and floors are also battened and protected in the same way. It is difficult to isolate the different stories of a building from each other on account of the openings for hoistways and stairways; but this has been effected in some cases—notably in that of the book-warehouse of Harper & Brothers in New York—by putting the stairways outside the walls. Mansard roofs have been made less dangerous by the use of iron instead of wood to support the slate. Floors now are sometimes made fire-proof by clay bedded upon a metal support. But none of these devices, nor any others thus far adopted, afford absolute protection, under all circumstances, against the invasions of fire.

FIRE-PROOFING. Attempts have continually been made to render cotton, linen, and other textile fabrics, timber, etc., incombustible; but at present they have been but partially successful. There are many means by which fabrics may be prevented from flaming, their combustion being reduced to a slow smoldering; and the many cases of fatal results from the extravagant dimensions of ladies' dresses (crinoline) rendered the adoption of some such protection against fire very desirable. By moistening the fabric with a solution of any saline substance, which, upon drying, will leave minute crystals deposited in or between the fibers, its inflammability will be greatly diminished, but the salt imparts a degree of harshness to the fabric, and in many cases weakens the fibers. Alum, sulphate of zinc, and sulphate of soda have been used, and are effectual to prevent flaming, but they weaken the fiber. Common salt does the same. Phosphate and sulphate of ammonia are less objectionable on this account, but the former decomposes by contact with the hot iron in ironing. Tungstate of soda has been proposed, and is said to have no injurious effect on the fiber. Sulphate of ammonia, chloride of ammonium (sal ammoniac), and borax, are among the best fitted for domestic use, though they are not unobjectionable. For made-up clothing, borax is, perhaps, the best, and it is most effectual in its action, and is the least injurious to the appearance of the article, though it is stated to have some weakening effect on the fiber; this, however, is only perceptible in case of a tearing strain, and will not perceptibly damage such articles as ladies' underclothing, or anything else only subject to ordinary wear. Wood has been treated in a similar manner. Milk of lime, alum, sal ammoniac, sulphate of ammonia, chloride and sulphate of zinc, sulphuret of lime and baryta, etc., have been used, and its *inflammability*, but not its *combustibility*, is destroyed. Like the fabrics, when similarly treated, wood smolders slowly. The most efficient protection to wood is silicate of soda. If planks of moderate thickness be brushed three or four times over, on each side with a strong solution, they are rendered almost incombustible; they will only burn when very intensely heated. The silicate fuses and forms a glass which envelops the surface, and even the interpal

fibers of the wood, if it be sufficiently saturated, and thus seals it from the oxygen of the air.

FIRE-PROOF SAFES AND REPOSITORIES are used as receptacles for deeds, paper money, account books, and other valuables. They are now regular articles of commerce, and are to be found in almost every counting-house, lawyer's office, jeweler's or watchmaker's shop or warehouse, and are indispensable to banking and such-like establishments. Our forefathers used oaken chests secured with iron straps and studs for similar purposes. That which formerly contained the crown jewels of Scotland, and is still exhibited in Edinburgh castle, is a good example. Subsequently, iron chests made simply of stout cast or wrought iron were used. The modern safe has double walls and doors of stout iron plates, and the space between the plates is filled with some substance that shall resist the transmission of the heat, which would be readily conducted through solid iron. The materials used for these linings are very various—sand, dried clay, charcoal, ashes, bone-dust, alum, gypsum, etc. The safes of Messrs. S. Mordan & Co., which are largely used by bankers, are lined with a mixture of equal parts of sawdust and alum. Some makers include small vessels containing liquids; the vessels burst when heated, and the liquids exert some cooling effect. Alum acts in nearly the same manner. It contains 24 equivalents of water, or nearly half its weight. At 212° , ten equivalents are driven off in vapor; at 248° , ten more; and at 392° , the four remaining equivalents are volatilized. It is a mistake, however, to suppose that any of these linings can render such a safe really fire-proof; and this is admitted by the more scrupulous manufacturers, who carefully abstain from using the designation of "fire-proof," but apply that of "fire-resisting," which honestly describes all that they are capable of doing, as they may resist the action of fire for a considerable time; but whether or not their contents may be ultimately preserved from a fire, is simply a question of the duration and intensity of the heat to which they are exposed. Their great weight in some cases assists in preserving them, especially when on an upper floor, as such a safe would be the first thing to break through the burning joists and descend to the lower part of the building, where the fire is usually the most smothered. These safes are sometimes let into recesses of stout masonry, built on purpose, and protected by an additional double iron door. This, of course, adds greatly to their security. All such safes should of course be secured by the best locks that can be made, protected by every possible precaution against picking, blowing up by gunpowder, or other violence. See **LOCK, and SAFES, FIRE-PROOF**. Such a safe may be described as an iron strong-box, lined with some fire-resisting medium. It is claimed that the idea of such a structure originated in this country with Mr. James Conner, type-founder of New York, somewhere about 1832, and that he carried it into effect by placing a safe lined with plaster of Paris in his office. His invention was not patented, however, neither was its value tested by fire, and it was thrown aside after a few years. In 1843, a Mr. Fitzgerald took out a patent for the same or a similar invention. Nine years before this, however, William Marr patented in England a method for constructing a fire-proof safe. In the space between the inner and outer walls of his structure, Marr placed sheets of mica pasted upon paper, and then packed the space full of either burnt clay and powdered charcoal, or powdered marble. Since 1843, both in this country and in England, the invention, in one form or another, has come into general use, and different inventors have busied themselves with improvements. Charles Chubb, of London, used baked wood-ashes for filling; Thomas Milner, of Liverpool, inclosed one, two, or more inner cases, with spaces between for some absorbent material, in which were placed vessels, pipes, or tubes filled with an alkaline solution, or any other matter evolving steam or moisture, to be discharged into the surrounding absorbent materials on exposure to heat or fire; other English inventors filled the inner spaces with ground alum, finely sifted, and finely pulverized gypsum, mixed together, heated to liquefaction, and forming when cool a brittle substance, which was comminuted into a fine powder; later still, another English inventor used powdered alum and sawdust for filling. The material upon which we must chiefly depend for making a safe fire-proof is water, so placed that it may be liberated as steam, since nothing can burn in a safe when its filling furnishes steam at 212° F. It is also important that the supply of steam may be continued through a protracted fire—that the material may retain its water until required by heat—and that in ordinary use the safe may be free from dampness. Safes have been built to contain pipes or cans full of water, to be set free on the melting of some easily fused metal. Substances which contain water in their chemical composition are more serviceable, alum being a notable example. Among materials used for filling safes are soap-stone, alum alone or with plaster, clay, or paper pulp, gypsum with copperas, or asbestos, tiles, raw cotton, sawdust and whiting, hydraulic cement, etc. Herring's safe is filled with double sulphate of lime, the residue of soda-water manufacture. It is dry and changeless at common temperature, but gives off carbonic acid at 1000° F., the temperature of red-hot iron. Plaster of Paris and alum are also used for the water which they contain, and the filling, when heated, furnishes a compound of carbonic acid and steam.

FIRE-RAISING, in the law of Scotland, is the equivalent term for arson (q.v.).

FIRE-SHIP, a vessel, usually an old one, filled with combustibles, sent in among a hostile squadron, and there fired, in the hope of destroying some of the ships, or at least of producing great confusion. Livy mentions the use of such by the Rhodians, B.C. 190; but among the first occasions in modern times when they are known to have been employed, were by the Dutch in the Scheldt during the war of independence in the Netherlands, and, shortly after, by the English in 1588, against the Spanish armada. The Chinese tried them against the British fleet before Canton in 1857, but unsuccessfully.

FIRE-WORKS. See PYROTECHNY.

FIRE-WORSHIPERS. See GUEBERS.

FIRISHTA, MOHAMMAD KASIM HINDU SHAH, a celebrated Persian historian, b. towards the end of the 16th c. (1570?), at Astrabad, on the Caspian sea. At a very early age, he went with his father (Gholam Ali Hindu Shah) to India, where we find him, when 12 years old, at Ahmednuggur, in the Deccan, sharing the instruction which the latter gave to prince Miran Hussein Nizam Shah. He afterwards became captain in the body-guard of Murteza Nizam Shah; and when this king was deposed by his own son, F.'s former fellow-student—who, in his own turn, was deposed and murdered in less than a twelvemonth afterwards—F. went to Bijapore (998 H., 1589 A.D.), where Ibrahim Adil Shah II., the reigning monarch, received him with great honor. He also appears to have conferred a military rank upon him, as, soon after his arrival, F. is mentioned as taking part in an action against Jumal Khan, in which he was wounded and taken prisoner, but ere-long he made his escape. His death is supposed to have taken place shortly after the year 1612. His great work is the *Tarikhi Firishta*, or History of the Mohammedan Power in India, which he finished in 1018 H. (1609 A.D.). Twenty years were spent in its preparation, and the number of books used for, and partly embodied in it—special histories of certain periods and provinces—amounts, according to F. himself (introduction), to 35; but 20 others besides these are quoted in the course of the work. It consists—besides a preamble or introduction on the Progress of Mohammedanism in India, and a final treatise on the geography and the climate of India—of 12 divisions, treating of the kings of Ghizni and Lahore, Delhi, the Deccan, Guzerat, Malwah, Candeish, Bengal and Behar, Mooltan, Scinde, Cashmere, Malabar, and of the saints of India. Written with an impartiality, simplicity, and clearness rare in an eastern work, this history has become a standard work on the subject, into which it was the first to enter at length. Single portions of it have been translated by Dow, Scott, Stewart, Anderson, etc.; but the whole work, edited first by J. Briggs (Bombay, 1831, fol. 2 vols.), was also translated by him (London, 1832, 8vo, 4 vols.). A fuller account of F.'s life and writings, by the same, will be found in the second volume of the Transactions of the Asiatic society.

FIRKIN (dim. from *four*, the fourth part of a barrel), an old measure of capacity containing nine gallons (old ale and beer measure). But previous to the year 1803 it had two values, being estimated at eight gallons in old ale measure, and at nine in old beer measure. The F. is equivalent to $9\frac{1}{2}$ imperial gallons. See GALLON.

FIRKOWITSCH, ABRAHAM, 1786-1874; born in the Crimea, of Jewish parents. He became a thorough master of the Hebrew text of the Old Testament, and of many other works, turning his attention particularly to the literature of the Caraites, a religious sect among the Jews. He was instrumental in establishing a printing press for the Caraites of the Crimea, and the reproduction of ancient manuscripts and modern books. In his search for ancient documents, he penetrated the depths of remote Asia, finding many valuable papers not before known to exist, and unintelligible even to their possessors. He was indefatigable in his work, digging over old cellars and searching the nooks of ancient houses, and brought to the imperial library at St. Petersburg 1500 MSS., nearly all of great value.

FIR LOT (according to Jamieson, from Ang.-Sax. *feorth* and *lot*, the fourth part), an old Scotch dry measure, of which there were four in a boll (q.v.). Though differing in value for different substances and places, its relation to the boll remained invariable. See PECK.

FIRM. See PARTNERSHIP.

FIRMAMENT, a word in use of old to signify the vault of heaven. The term found its way into English from the Vulgate, which renders the Septuagint *Stereoma*, and the Hebrew *Rakia*, by the Latin *Firmamentum* (Gen. i. 6). *Rakia* (from the verb *raka*, to beat or strike out) signifies whatever is expanded or stretched out, and was specially employed by the Hebrews to denote the hemisphere above the earth, compared (Exod. xxiv. 10) to a splendid and pellucid sapphire. Elsewhere (Ez. i. 22-26) it is spoken of as the "floor" on which the throne of the Most High is placed. Hence it follows that the notions of solidity and expansion were both contained in the Hebrew conception of the firmament. The blue ethereal sky was regarded as a solid crystal sphere, to which the stars were fixed (compare the *cælo affixa sidera* of Pliny, ii. 39 and xviii. 57), and which was constantly revolving, carrying them with it. This sphere or firmament

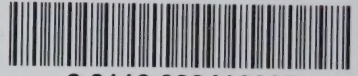
divided "the waters which were under the firmament from the waters which were above the firmament;" and the theory of the phenomena of rain, etc., was, that there were "windows in heaven"—i.e., in the firmament, through which, when opened, the waters that were above the firmament descended. "The same day were all the fountains of the great deep broken up, and the windows of heaven were opened," Gen. vii. 11. The view entertained by the Greeks, and other early nations, was essentially the same. In the progress of astronomical observations, it was found that many of the heavenly bodies had independent motions, inconsistent with the notion of their being fixed to one sphere or firmament. Then the number of crystalline spheres were indefinitely increased, each body that was clearly independent of the rest having one assigned to it, till a complex system was introduced, capable of being fully understood only by the philosophers who formed it. See PTOLEMAIC SYSTEM. It was long before men formed the idea of the possibility of a body being maintained in motion in space without a fixed support, and considering the number of phenomena of which the hypothesis of a crystalline firmament offered an apparent explanation, we must regard it as having been in its day a curious and ingenious speculation.

FIRMAN, a word of Persian origin, signifies an order, and is used by the Turks to denote any official decree emanating from the Ottoman porte. The right of signing any F. relating to affairs connected with his special department is exercised by every minister and member of the divan, but the office of placing at the head of the F. the *thograï*—a cipher containing the name of the sultan in interlaced letters, and which alone gives effect to the decree—is committed to the hands of a special minister, who is called *nichandji-effendi*. The name applied to such decrees as have been signed by the sultan himself is *hatti-sherif*. The name F. may also signify a more formal kind of Turkish passport, which can only be granted by the sultan or by a pasha.—A written permission to trade is called in India a firman.

FIRMINY, a t. of France, in the dep. of Loire, 6 m. s.w. from St. Etienne, with which it is connected by a branch railway. Near it are rich coal-mines. It is a place of much activity, and has manufactures of cast steel, etc. Ribbons and nails are among the articles of manufacture most largely produced. Much lamp-black is also made. Pop. '91, 14,502.



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